The
Electrical Review

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The Institution

IN 1929 the old grade of Associate of the Institution of Electrical Engineers was broken up, and two new grades of non-corporate members were formed. One retained the old name of Associate, and in it were included all those whose technical qualifications did not render them eligible for corporate membership.

Members of the other grade received the title of Companions; it was hoped to attract men of standing who, though non-technical, would contribute valuable experience and influence.

How far has that hope materialised up till now? What are the expectations for the future? These questions are prompted by a remark made by the President of the Institution at Manchester last week.

Captain Donaldson expressed the view that the grade of Companion had not received the support it merited from those eligible for membership. Truly, a grade that contained in the autumn of 1930, when the last membership list was issued, only 119 members out of a total membership of over 14,000, can hardly have proved attractive. Moreover, all except a dozen or so of the Companions were connected with the Institution more than five years ago.

Assuming that it is desirable to have the grade of Companion at all, how far is it the fault of the Institution itself that the grade has not justified the hopes entertained for it?

Further, can we expect it to do so unless some effort be made by those within the Institution? Of the several thousands of men in the industry whose connection with the Institution would be of mutual advantage, there must surely be many hundreds who would be ready enough to join an Industrial membership properly constituted and adequately made known.

The leading commercial, financial, and industrial men have no organisation for discussing non-technical matters. Perhaps they have an idea that a technical institution is not the place for them. There is also the question whether technical men generally believe that the Companionate or Industrial Section can be of use to the Institution. Is it reasonable to expect busy men, with only a hazy idea as to what the objects of a primarily technical body are, to take the entire initiative?

It has often been suggested that the Institution should concern itself with other aspects of the electrical industry than the purely technical. Its membership includes men who are distinguished in finance, commerce, and industrial organisation, but their membership is based upon their technical qualifications, and they by no means monopolise the ability of the industry.

If the Institution desires to carry weight, other than technical, in our rapidly developing industry, it must be in a position to draw upon the counsels of all those likely to help it. It may remain primarily a technical body, but it must decide whether it will or will not make full use of the non-technical brains.

What is it going to do about the men and women who will be employed, in increasing numbers, in developing the sales of electricity? Perhaps it is looking in another direction for an organisation which will answer this valuable purpose.

Situations Vacant and Wanted

FOR many years the columns of the ELECTRICAL REVIEW have been the recognised place for announcements of situations wanted, situations vacant and other small classified advertisements. From this week onwards, we are making some changes in that section which we hope will make reference to its contents more easy. We should like to add that in connection with situations vacant, it does not seem to be known as widely as it should be that we insert, free of charge, notice of any appointment being filled, so that unsuccessful applicants are not kept in needless suspense. We, ourselves, cannot do more than make such an offer; it would be a kindness if use were made of it more frequently.

Which Should It Be?

WE know what we have been taught to do when it becomes necessary to choose between two evils, but when the problem before us is to decide whether an excellent chairman of a municipal electrical committee or an equally excellent borough electrical engineer should be sent as the delegate to the I.M.E.A. conference at Cardiff in June, we have to reply that such a situation has never before arisen. According to the *Islington Gazette*, the local Electricity Committee wanted both Alderman Vorley and the electrical engineer to go, but wonderful things are being done in the name of "economy," and remarkable things are being said in the same connection. Solomon was about to split the innocent into two when human nature delivered judgment. Islington Committee had to face an amendment that the Council and the engineer should be divided. One of the opponents is actually reported as saying that attendance at the conference was of no benefit to the Council, and gave it no help in carrying out its work.

The Solution

THE decision of Hackney, already recorded, to give the convention the go-by this year seems to us to be more reasonable than that of Islington. Municipal councillors need educating as to the purposes of the I.M.E.A., and the great advantages that its conventions have been reported to bring to the electricity supply industry, because chairmen and engineers have gone together. Indeed, how many chairmen would be lost without their engineers? Altogether things do not seem very promising for Cardiff—three days instead of six, some corporations deciding not to be there at all, and others showing so half-spirited an attitude towards electrical development as to pay one fare instead of two. Again, it seems that one good convention in which all three electrical organisations would unite would be the best way out.

Irritating the Buyer

THE letter from "System" in our Correspondence columns to-day reveals a pretty bad state of affairs. The pen-name conceals the identity of a responsible electrical engineer, who seems to have been very unfortunate in his dealings with the electrical and radio trades. Although he has no doubt had more than his share of exasperating delays and neglect, no one will deny that those experiences are becoming too common. All of us have suffered from this laxity, which seems to pervade most branches of trade, and some of us may have been responsible at times. It is so easy to leave a minor matter over until to-morrow, and perhaps again for another day, but in the meantime some disgruntled customer is gnashing his teeth, gaining a bad impression of the concern with which he is dealing, and telling all his friends. With so much talk of "service," this situation is surprising. If matters cannot be handled upon the same day as they arise the concern is either inefficient or under-staffed, and easy remedies exist for both. Let us not forget that nine-tenths of service lies in the old "pre-service" motto "Do it now!"

Lax Tendering

TO-DAY we also print a letter from the Town Clerk of Islington drawing our attention to the fact that eleven firms who tendered for the annual supply of stores for the Council's Electricity Department failed to comply with the conditions set out in the advertisement. This is inexcusable at a time when work is so difficult to obtain, and there are so many people after it. We agree with our correspondent that it is reasonable for the Council to lay down conditions and to expect them to be followed. If a job is worth having, attention to such details should not be too much trouble.

Don't Arrest Development!

A CORRESPONDENT in this issue makes a very fair criticism of the remarks on "Cooking and Boiling" in our last issue, which were intended, of course, as a brief review of the whole of the opinions published under "Still the Boiling Plate." Long drawn-out correspondence is sometimes apt to lose its piquancy, especially when there is one-sidedness. The supply engineer has learned at much cost that the consumer's point of view is of paramount importance, and speeding up of boiling has led in every case to much increased sales. Certainly running costs and all issues bound up with thermal efficiency are important, but not in the broad and urgent problem of how to arrest immediately unfavourable comparisons with gas cooking. Electric cooking has definitely reached the point when it *can and does* compete with gas cooking, and nothing must be done to delay its development while work is going on to secure the "ideal" boiling plate.

Boosting the Furnace

SOME branches of electrical work are appropriate to particular periods of the year. The overhauling of lighting and other domestic arrangements, for example, is due when spring-cleaning is in hand; looking at the office fans and ordering new ones, a little later, say just too late to miss our few hot days; new lamps and fittings improvements, again in readiness for when the shades of night are falling fast; electric fires for the cool mornings and evenings of spring and autumn, and for the winter-time as well. But electric furnaces and electric refrigerators blow hot and cold respectively all the year round. The electric furnace is really an industrial thing, and we want to see it contributing its part to the revival of industries of many kinds during 1932.

Six Months' Campaign

IT is doubtless with such an idea in mind that E.D.A. has just started up an electric furnace campaign which will run on through this winter and the springtime and end early in June, when summer and conventions may be with us. E.D.A. and its furnace-makers' section are specially co-operating with the object of bringing the directors and financiers, who largely decide the course of affairs in modern industry, to appreciate the merits of industrial electric heat. The furnace-making firms will deal separately and directly—that is, without the help of E.D.A.—with the works managements likely to be interested. We add our own hope to that of E.D.A. that members of the Association who are working in industrial areas will do their utmost without delay to influence the minds of potential users of electric furnaces for any purpose.

Popular Domestic Appliances

THE inexpensive and economical electric iron is easily the most popular domestic appliance. It should be in every home in which electricity is used for lighting, as is almost literally the case in the U.S.A. Some very interesting figures regarding what was happening in America during 1931 are published in our "Notes" to-day. There vacuum cleaners, which hold second place in general esteem, are installed in nearly half of the wired houses. Washing machines and toasters follow closely, indicating that the former should have a wider sphere than is generally believed in Great Britain, and that the adverse criticism of electrically produced toast on a notorious occasion a few months ago is not supported by the man in the street. Electric clocks, which have been the subject of considerable discussion in our pages during the last few months, are to be found in 3,350,000 wired American homes, and we think we are justified in expecting them to be in very large demand in this country at an early date.

Load Building

Commercial and technical progress at Croydon

OF the various business-getting schemes of supply undertakings which it has been our privilege to investigate, those practised by the Croydon electricity undertaking under the direction of Mr. F. N. Rendell Baker, A.M.I.E.E., chief engineer and manager, rank high in the list for progressiveness, initiative and general understanding of the consumers' requirements. After seeing and listening to what has been and is being done, service and specialisation stand out beyond all other impressions as the governing features running through all the projects—commercial and technical.

These key points are first observable in the selling organisation. There is a chief sales assistant and three sales representatives—one a lighting expert and the others specialising in water heating and refrigeration, respectively. The representatives are responsible for all outside calls, but they specialise whenever and wherever necessary in their own particular subjects. There are also one washing-machine and two cooking demonstrators.

In addition to two female and one male assistants in the showroom there is a showroom mechanic who is available for all small repairs and contributes largely to the essential requirements of *immediate service*. One of the showroom assistants also specialises in vacuum cleaners.

Croydon's showrooms are renowned, and were described in the ELECTRICAL REVIEW of March 12th, 1926, p. 408.

Publicity Pays

Main-window displays, advertising and mailing, are arranged in conjunction with one another, and the general scheme is based on a programme of window displays compiled about twelve months in advance. Apart from this general mailing scheme, special mailing in conjunction with manufacturers' demonstrations, seasonal work, and concentrated mailing are undertaken.

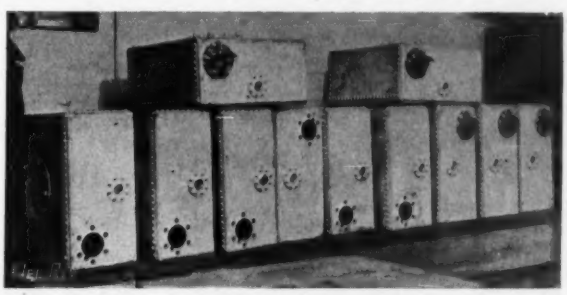
Bottom of converted water heater; components in foreground

In the last scheme a certain number of prospective consumers in a district are chosen and pamphlets dealing with various types of apparatus and hire-purchase wiring schemes are posted in a definite sequence periodically. In one instance 200 consumers resulted from mailing 2,000 "prospects" in this way.

The method of dealing with prospective consumers in a road where there is no main is worth consideration. The houses are first circularised and then canvassed. It is a hard-and-fast rule never to canvass without previous circularising. The representative, in addition to giving particulars of how to obtain the supply, informs the likely consumer that it would help to produce the necessary revenue to make the laying of a main profitable if cookers were installed, and this has been found to be a very effective means of getting cooking business.

In a large block of flats now under construction, as a result of urging upon the builder the saving in water-heating arrangements by the installation of immersion heaters, electric cookers are to be installed in all the flats, gas services definitely being kept out of the building.

The flat-rate tariffs in the borough are 6d. per kWh for lighting, and 1.25d. per kWh for heating, while a two-part domestic tariff embodies a standing charge of from 11s. per quarter, based on floor area, plus 0.675d. per kWh for the winter quarters and 0.5d. per kWh during the summer. For business premises there is a standing charge of £12 4s. per kW of lighting load and the same "unit" charges as for the domestic tariff.



Bank of 25-gal. tanks being fitted with immersion heaters for block of flats

The undertaking will hire-purchase any equipment of over £5 in value, and a large number of washing machines and refrigerators are sold on this basis—sufficient to warrant specialists' time in selling them. Energetic development of the cooking and water-heating loads has resulted in extensive hiring schemes for these classes of equipment—cookers at from 5s. 6d. per quarter and water heaters at from 2s. per quarter.

To overcome slow-boiling troubles the undertaking decided recently to adopt the heavy-element type of boiling plate, and all new cookers hired out now are of "Revo" manufacture, all-enamelled, with one "Superspeed" boiling plate. The popular "Revo" model in the borough, the "Croydon," with one 2,000-W "Superspeed," one 1,000-W closed plate, a separate grill (1,500 W), and an oven loading of 1,800 W for 13 in. by 13¾ in. by 12¾ in. cooking space, is hired out at 7s. 6d. per quarter, with up to 30 ft. of wiring free.

So far as the new open plate is concerned there appears to be no need for special utensils, although it is emphasised that the vessels used should have dull and reasonably flat bottoms. Since the introduction of free wiring and the new cooker the output of cookers has increased from an average of 5 or 6 per week to 20.

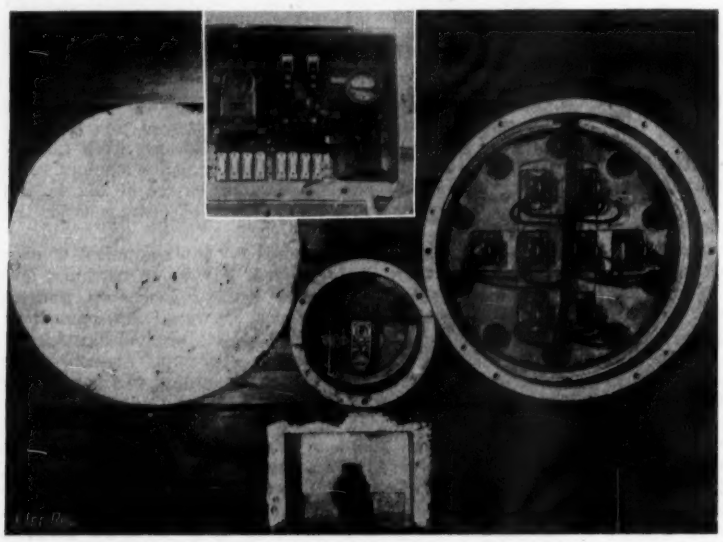
Assembly of essential components on reconditioned cookers: Two "Chromalox" hot-plates on side to side support bars; one "Superspeed" and one closed plate on existing supports; transformer fixing and h.v. and l.v. feeds

Reconditioning Domestic Apparatus

There are something like 1,500 old-type cookers in service, and it became necessary to decide whether they should be scrapped or brought up to date. It was found that they could be converted fairly cheaply, and two schemes have been adopted. One provides for the fitting of two "Chromalox" plates to each cooker at a total cost of about £5, and the other for one "Superspeed" and one closed plate at a total cost of about £7. These prices included a new enamelled oven interior and an enamelled hob.

The required parts are purchased and assembled in a well-appointed workshop by skilled fitters, each a specialist in one particular field, while all the men are available for everyday work. For fitting the "Chromalox" plates the existing four support bars of the old plates are replaced by two bars in the opposite direction (side to side), the latter being drilled to jig and held in position by two clamps on the cooker frame.

A man can therefore be sent out if necessary with the requisite components and convert a cooker in position in 30 minutes. Although the other conversion scheme must be done in the workshop the same methods are employed. The old plates are removed together with the switch casing, a jig is fastened to the existing holes, and all the necessary extra holes are bored with an electric drill. The transformer is secured to the bottom of the cooker by angle irons, and the transformer lugs and the cast feed bars of the "Superspeed" plate are connected up by 1 in. by ⅛ in. copper bars down the cooker side. The transformer is protected by a perforated box and the 10-V bars by a light cast casing.



Elements and thermostat on 250-gal. rectangular tank at Davis Cinema. Inset, contactor gear, time switch and meter for this equipment

Water-heating Schemes

Much attention is given to domestic water heating, both by self-contained apparatus and by immersion heaters. The water heaters at present installed account for something like 2,000,000 kWh per year. "Ferranti" and the smaller types of "Sadia" and "Inventum" heaters are rented at very moderate charges—a 17-gal. pressure or ball-valve heater can be obtained for 6s. 6d. per quarter.

Owing to the large amount of scale deposited from Croydon's water the original "Inventum" heater is unsuitable because the element housings become filled with the scale in a very short time. The heaters are therefore being converted to ball-valve push-through apparatus with the inlet at the bottom and the outlet at the top, and with the element and thermostat housing removed, so that the scale falls off the element to the bottom of the heater, thus lengthening the scaling period to three years or more, and quickly saving the total conversion cost of £3 15s. in reduced maintenance.

A set of castings was produced and one jig made suitable for drilling both the castings and the heater, with the result that a standard unit is suitable for all the heaters in question above 1½-gal. capacity, differing only in the length of connecting pipe and the element loading.

Whenever a costly replacement is necessary in any make of water heater a pattern of the flange is made together with suitable jigs and the standard immersion element and thermostat are used. In this way some of the very old type "Zent" heaters have been reconditioned and sent out again as new.

The standard element and thermostat unit referred to consists of "Chromalox" blades and a "Satchwell" thermostat secured in a light flange, and such units are fixed extensively in existing coke-fired hot-water tanks and hired out at 6s. per quarter, with a cash payment (by instalments if desired) for the wiring.

Wherever practicable the immersers are placed in the tops of the tanks, for which cases the blades are more heavily loaded at the bottoms, so as quickly to provide hot water at the tank top and at the same time to heat the bulk of the water evenly. A heat-resisting distance piece is secured to the flange outside the tank and finished off with a collar which allows the match-boarding of the case surrounding the tank to be fastened underneath it and a cover on top. The space between the tank and the case is filled in with granulated cork, and the efficiency of the whole job is equivalent to that of the small self-contained heater. The thermostats are generally set to operate at 160 deg. F. No conversion scheme is undertaken unless reasonable efficiency can be procured.

Off-peak Water Heating

To encourage long-hour off-peak load large-scale water heating is catered for at specially low tariffs. Immersion blades are fitted into standard flanges, and suitable banks can be used to give any loading for any tank capacity. At the Davis Cinema there is a 100-gal. "Ferranti" heater designed on the "Croydon" lines specially to cope with the heavy scale. In the same premises may be seen a 250-gal. rectangular tank fitted with 16 "Chromalox Croydon" blades, supplied by Messrs. Geo. Bray & Co., Ltd., in two banks of eight, 25 in. long inside the tank and loaded at 500 W each. The blades are arranged horizontally in the tank, but "on edge," so that the scale cannot lodge and build up. This installation is of the push-through type and was designed and fitted up by the undertaking.

In the cinema building was also seen a tank fitted with Croydon-pattern immersion elements for hot-water supply in the café and kitchen.

"Thor" and "Hera" washing machines are supplied on hire-purchase terms, or for cash, at the rate of about one per week, while in spite of the fact that the Corporation water department has this year instituted a charge of £1 per year for the water supply to each "Electrolux" refrigerator supplied by the undertaking the sales in this apparatus have not decreased. Although electricity is used fairly extensively for heating in Croydon, most of the fires are purchased from and through contractors. A small range of fires is included in the hiring schemes of the undertaking.

In the Schools

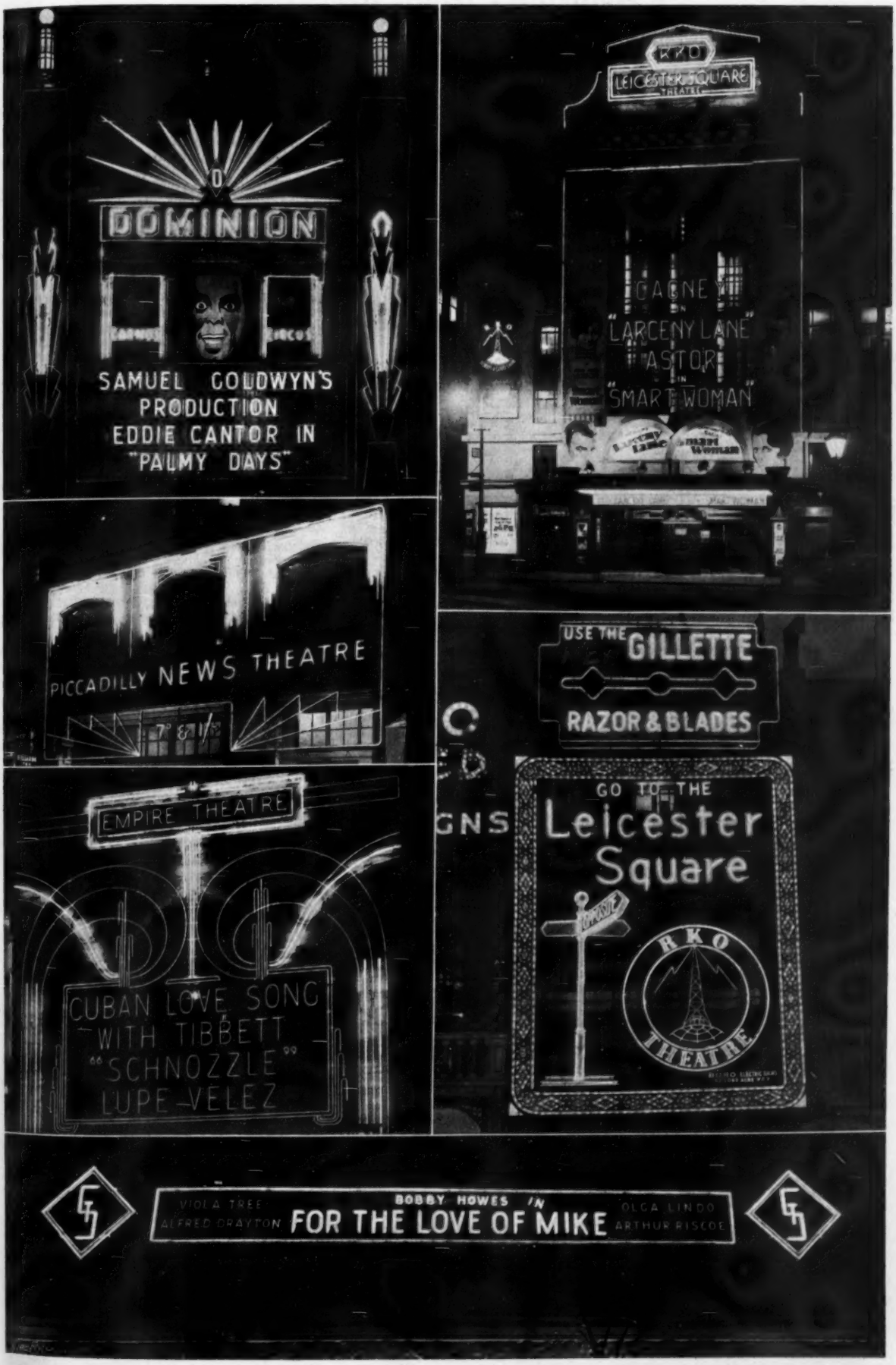
Every school domestic centre in the borough is equipped with cookers, wash-boilers and irons, the apparatus having been supplied free and the consumption being charged for at 0.675d. per kWh flat rate. As a result electrical apparatus is installed for staff requirements in every new school that is erected or in existing schools when they are reconstructed. It has been made abundantly clear that the students in the domestic classes much prefer to work on the electrical apparatus.

The following figures show respectively the number of appliances out on hire at the time of our recent visit to the undertaking and the number sent out since March last:—Cookers, 2,001 and 410; s.c. water heaters, 1,704 and 119; immersion heaters, 155 and 74; radiators, 1,709 and 58.

Hire-purchase wiring, including hire-purchase of small appliances, has also met with considerable success. The total number of agreements entered into to date is 627; at March last the figure was 466. The total number of connected consumers in March was 30,443, of whom 19,366 were on the "all-in" rate. Since then there has been an increase of nearly 2,000 in the total.

Every Wednesday afternoon demonstrations are held at the showrooms, and although they are essentially for cooking, other types of apparatus are displayed and the experts are present to demonstrate as occasion demands. The attendance at the demonstrations has increased from about 20, as the result of 120 invitations sent out, to an average of 60 or 70, mainly due to local advertising and the recommendations of existing cooking consumers.

It was in Croydon that E.D.A. found its Director and Secretary just over a year ago. With the riper experience that is his to-day one wonders whether Mr. Cramb looks back with affection to the progressive area of his earlier labours!



Some effective examples of neon tube decorative lighting in the West End

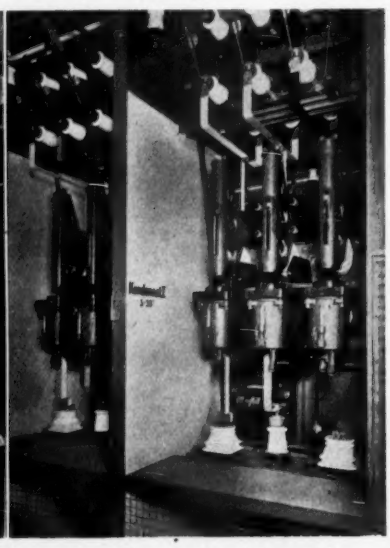
Expansion Circuit Breakers

The arrangements at the Barmen power station, Germany

THE power station of the Corporation of Barmen is situated at Wuppertal in the centre of the town. The space available for the extensions recently carried out was very restricted, and was made especially difficult by the need to house the switchgear for the auxiliaries under an arch of a railway which cuts through the power station site.

Three switchgear schemes were considered: *viz.*, ordinary oil circuit breakers, iron-clad compound-filled oil switches and expansion breakers. The engineers decided that the number of panels installed could be doubled if expansion breakers were used, thus leaving room for further extensions. The expansion circuit breaker, the peculiar feature of which is that water is used in place of oil, was described in the ELECTRICAL REVIEW of May 22nd, 1931.

Switches with metal casing removed



Rear view of 5-kV switch cubicle

Control of Auxiliaries

In all, the installation comprises 16 cubicles, into which 10 expansion breakers are built, each rated for 350 A at pressures up to 11 kV, and 15,000-A breaking capacity. Two cubicles control the incoming feeder cables from the main switchgear, and four cubicles are spares for future use. The cubicles are provided with sheet-metal front panels, on which the meters and other instruments are mounted.

A sheet-metal case in front of each switch panel houses the solenoid-operated mechanism and the isolating switch operating gear. This case also contains the fuses and terminals of the control pilot cables and the cables for the operating solenoids. These solenoids are fed from a battery in the main switchgear building. The rear of the switch cubicles is screened by expanded-metal doors through which the level of the "expanzine" in the gauge glasses of the expansion pots, as well as the position of the male contacts of the circuit breakers, may be observed. To top up the "expanzine" level the doors must be opened.

The expansion breakers and the cable-end seals are separated by means of a horizontal partition in which the instrument transformers and overload trips are fitted. The compartment below this partition is also screened by means of an expanded-metal door. This partition affords a safe means of examining the circuit breaker when the isolators are opened and the bottom door closed, and precludes accidental touching of the live blades of the isolating switches. Slabs of an asbestos compound are used as floor and cable-trench coverings, the latter being removable.

The cable ends are sealed off by means of the "bandage" type seals recently introduced by Siemens-Schuckert, which make unnecessary the use of compound filling required with the orthodox cable-end boxes. The instrument transformers are also of the non-filled type, so that the entire installation is practically fireproof.

The illustrations of the cubicles from the operating gallery and rear give a good idea of the clean lay-out which can be achieved. The straight run of the connections from the busbars *via* the switches to the cable-end seals is worthy of special note. Since with expansion breakers the current flows straight through (from top to bottom or vice versa) there is no loop in the path of the current.

The expansion breakers are placed waist high, which facilitates periodical examination or readjustment of parts. The top of the front panel is just below the busbar isolators to enable their position to be seen both from the front and rear of the cubicle.

By introducing expanded-metal guards between the duplicate busbar systems, one set of busbars can be handled independently without danger of maintenance men touching the other set. As this auxiliary switch room is separate from the other switchgear installation of the power station, the gallery is seldom used for operating the circuit breakers, except when overhaul or periodical examination of the plant is necessary.

In such cases the switches are operated by means of push-buttons provided on the sheet-metal control boxes in front of the panels. These push-buttons actuate the operating solenoid, but the switch can also be opened by the handle at the right-hand side of the control box. Normally some of the switches are operated from the control board in the turbine room, but those feeding the high-voltage motors are controlled from the boiler house.

Generator Switches

In the case of the switchgear for the generators the question of floor space was not so acute, and the general lay-out mainly depended on the nature of the existing building. The floor space allotted to the new switchgear is adjacent to the turbine room and is separated from it only by an existing switchboard, so that the deciding factor in the choice of the new switchgear was the elimination of every possibility of fire. It was held that expansion breakers, non-filled instrument transformers and "bandage" type cable-end seals would satisfactorily meet this requirement.

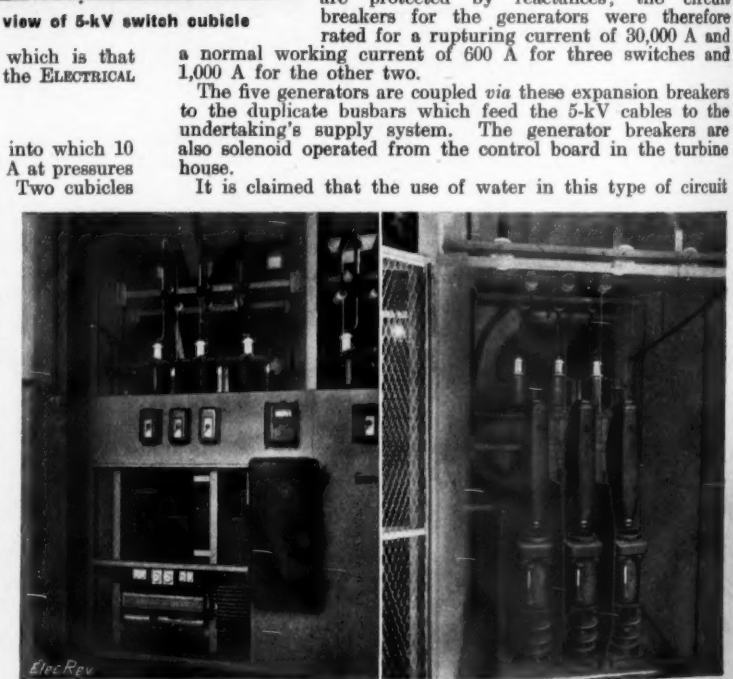
The kVA short-circuit capacity at the generator busbars is greater than that at the switchgear for the auxiliaries, since the latter are protected by reactances; the circuit breakers for the generators were therefore rated for a rupturing current of 30,000 A and a normal working current of 600 A for three switches and 1,000 A for the other two.

The five generators are coupled *via* these expansion breakers to the duplicate busbars which feed the 5-kV cables to the undertaking's supply system. The generator breakers are also solenoid operated from the control board in the turbine house.

It is claimed that the use of water in this type of circuit breaker causes the gas evolved when the contacts are separated to be completely deionised before the recovery voltage reaches a value at which an arc could be maintained or restruck.

The underlying principle is that the steam generated due to formation of the arc under water expands adiabatically and, becoming saturated, instantaneously condenses. Owing to the saturated state of the steam the molecules are closely packed, in consequence of which the free electrons in the arc space, being within the radius of attraction of the molecules, are immediately neutralised, and the arc space becomes deionised.

Another feature claimed for the expansion breaker is that a very small amount of burning is experienced at the contacts. Nevertheless, use has been made of the recently developed "S.S." metal, which, Messrs. Siemens-Schuckert (Great Britain), Ltd., inform us, reduces the burning effect to approximately one-twelfth of its normal value.



A 5-kV switch panel from operating side

Interior of generator switch cubicle

Electric Tool Control. By T. C. Gilbert, A.M.I.E.E.

Better installation methods to increase their popularity

A VERY interesting account of the construction and operation of several types of portable electric tools, covering most possible applications, was given in the ELECTRICAL REVIEW of November 20th, and the author's recommendation to " take the tool to the job " is unanswerable. Nevertheless, the portable electric tool is not nearly as popular as it should be.

In the first place, the blame for the fact that this state of affairs not only exists but persists cannot be laid at the door of the tool manufacturers. Portable electric tools are mostly produced by firms with wide experience in the manufacture of tools for all kinds of drives, from belts to compressed air, so that it can be safely assumed that they are well aware of the difficulties met with in ordinary operating conditions. Those designed by reputable makers are so robust that the mechanic's (and consequently the works manager's) preference for power-driven tools can be explained only by faulty methods of installation and

Probably the commonest forms of portable electric tools in use to-day are drills and grinders. The chief defects in the installation and control of these are :—(1) the installation of groups of sockets (with one overload device only) to supply several tools; (2) the use of fuses or cheap magnetic overload circuit-breakers; and (3) inadequate protection against shock.

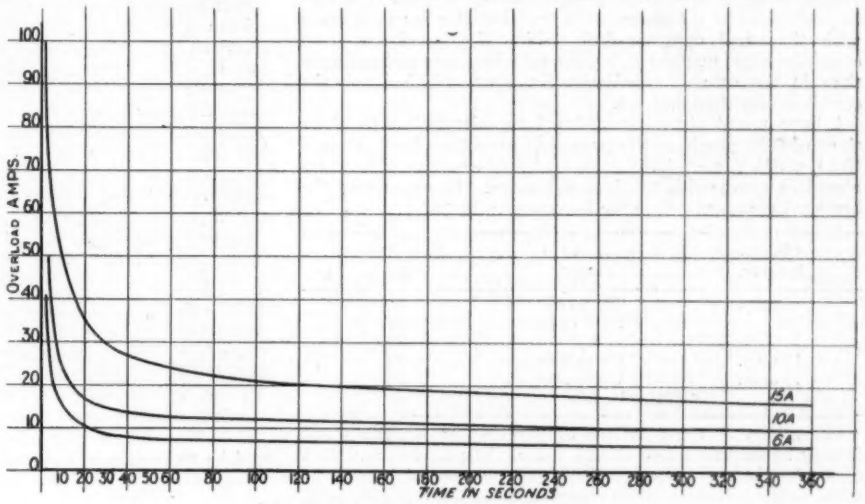
Interruptions of service due to poor design of plugs, connectors, or flexible leads should be easy to correct by employing suitable tough-rubber connections. In passing, I would draw the attention of our manufacturers to the American practice of employing tough-rubber leads vulcanised to the plugs and connectors. These are made up in standard lengths, the whole of which can be scrapped together, when necessary.

Defects of Group Control

To take the first point, the installation of one overload device to control a group of tools is electrically and economically wrong; electrically, because the rating of the fuse or circuit-breaker must then be that of the simultaneous full-load or even overload current of the several tools, so that it is incapable of closely protecting the individual tool, and economically because a fault or excessive overload on one tool renders several other tools idle also.

The idle portable tool is resented not only by the works manager but also by the mechanic himself. Thus, as an electrical superintendent of a large works pointed out in the " Correspondence " columns of the ELECTRICAL REVIEW of November 27th, foundry fettlers handle heavy castings upon which portable grinders are used, the payment for which is based on tonnage. Where grinding tools are run from line shafting with ample reserve power, pressure can be applied without the man's pausing to consider the possibility of bringing out the overload breaker.

Obviously, the trouble can be cured to a large extent by providing individual overload control to each tool. One manufacturer attempted to solve the problem by enclosing a fuse in the body of the machine. The correspondent pointed out that a mechanic drilling sheet steel, and constantly stalling his machine, soon converted his fuse into a link by the installation of a heavy copper wire. Even this solution of his problem could not cover faults on the flexible leads, connectors, &c. (where most faults occur), so that the shutting down of several tools is possible even with fuses in each tool.



Bi-metal releases under overloads

This brings us to point number (2), the use of fuses or magnetic circuit-breakers for overload protection. A fuse cannot adequately protect a motor at any time, especially a small motor, for, should it be rated to deal with comparatively heavy starting currents or momentary overloads, then it cannot efficiently guard the motor against low, but long-continued, overloads which are more likely to damage it in the long run.

A similar criticism can be levelled against the magnetic circuit-breaker. Although this has the great advantage that it can be easily and quickly replaced, and cannot be altered without authority, it must be " set up " (especially with a.c. machines), to such an extent in order to cope with heavy starting currents that its value under ordinary running conditions is doubtful. The addition of a time lag, whether ther-

The Aberdeen electricity showrooms to which Mr. J. A. Bell refers in his article on page 165

mal or dash-pot, reduces this defect to some extent, but only at the expense of complicating the circuit-breaker and rendering it more expensive and less reliable. It remains incapable of protecting the motor against the low long-period overload, except possibly in the larger and more costly patterns.

Thermal Circuit-breakers

The practice is growing upon the Continent of protecting small portable tools by circuit-breakers which are operated by the thermal effect of the whole current passing. Such a form of protection is correct in principle, and supplies the best safeguard for the small motor. The destructive long-continued overload sooner or later opens the circuit, whilst a certain latitude is allowed in the case of heavy overloads of short duration. The compact mechanism is extremely reliable, and the thermal element is a simple bi-metal strip fitted to each pole.

It is often assumed that purely thermally operated circuit-breakers cannot be sufficiently rapid in their action and should be backed up by a fast magnetic trip, but this is not the case with the small currents dealt with. The inertia of some circuit-breakers may result in disconnection being rather slower than in the case of equal capacity fuses, which break the circuit in less than 0.01 sec.

I have tested three circuit-breakers, identical with those shown in the graph on the preceding page (*i.e.*, for 6, 10, and 15 A), at 275 V, a.c. 500-V fuses of the values given below were placed in series with the bi-metal strips. In every case the breaker functioned before the fuses were affected.

Circuit-breaker.	Load (amp.).	Fuse Rating (amp.).
6 amp.	Up to 60	20
	100 to 150	25
	500	35
10 amp.	Up to 400	35
15 amp.	Up to 200	35
	500	60

The ability of these devices to stand up to workshop and factory abuse was tested at 275 V d.c. The 6-, 10-, and 15-A circuit-breakers were each satisfactorily released at 700 A, and twice at 900 A, with a 100-A fuse plug in series. At 550 V d.c. the same switches were each brought to release at 38, 80, 110, 140, and 190 A, and three times at 580 A; a 60-A fuse plug in series remained unaffected, and the circuit-breakers remained undamaged. The powerful magnetic blow-out coils materially assisted the breaking of these heavy overloads, but the speed of disconnection is obviously sufficient for all practical purposes, and overloads of this magnitude are hardly likely in practice, when the ohmic resistance of sub-circuit wires and cables must limit short-circuit currents.

Cheapness or Service?

These circuit-breakers (which are not costly) in my opinion provide the best form of overload protection for portable tools. If the full benefits of portable electrical devices, and not alone tools, are to be enjoyed, then cheap slap-dash installation methods must be discarded and a little more study given to control. It seems to be a common idea that the benefits of electricity can only be enjoyed by the multitude if the installation methods are the cheapest possible, whereas the truth is that the consumer is robbed of the full benefit of his apparatus by such methods, and electrical appliances are not given a real chance.

When a works manager purchases electric grinders or drills, he is buying electric grinding or drilling *service*. The desired service may be divided as to 50 per cent. tool and 50 per cent. installation and control, so why should not their respective costs approximate? From £10 to £40 may be spent on the tool, but the cost of the wiring, etc., is cut to about £1 per plug.

The electric tool is capable of far better service than any other form of portable tool, but *only* if it be installed with foresight and properly controlled. The attitude "Why not use electric drills? You can run them from your lighting points" is wrong, is unnecessary, and has done a great deal of harm.

Protection from Shock

Regarding point number (3), mechanics have complained of shock where there was no shock, probably due to vibration in some part of the mechanism, even as housewives complain of shocks from their vacuum cleaners. Shocks *are*, however, sometimes received from portable electric tools, but in the majority of cases they are due to defects in the plugs, connectors, or flexible leads. The tool manufacturer is to be blamed only for incorporating the wretchedly ineffective connecting devices that are sometimes used.

Earthing the tool will not dispose of the difficulty. It has often been found in practice that the earth wires originally installed have been subsequently removed owing to the heavy damage sustained by the tool in the event of an earth fault, usually due to over-fusing.

The damage is mostly to the brush-gear, where a certain amount of copper and carbon dust from the commutator and brushes has collected upon the small insulating bushes supporting the brush-gear; with the frame of the motor earthed there is ample opportunity for earth leakage over these bushings, and the final flash often renders repair difficult.

Earth connections are, moreover, unreliable, whether in three-pin plugs or elsewhere, and they cannot be properly tested without the daily use of expensive instruments. A resistance of a few ohms (which is quite common) in the earth socket of three-pin connections will completely upset the protection afforded by the earth wire. With all these and other drawbacks it is small wonder that earth wires are omitted, sometimes by accident, but more often by design.

The mechanic using a grinder on large masses of metal, or a drill on a steel building, *should* be protected against shock; even a slight shock in the latter case may result in a fall. Some authorities have recommended transformation to some safe low pressure, but this method is cumbersome and can obviously only apply to a.c. working. There still remains the problem of tools fed from d.c. supplies, and those which are carted round the country by erecting firms, and which must be universally available for use from local supplies, whether a.c. or d.c.

The insulation of the outer casing of the tool has not met with marked success. I must therefore again refer to Continental practice, although reluctantly, and to the method of leakage protection by which, in my opinion, all the above troubles have been overcome.

Earth Leakage

The thermal overload device, above referred to, can be fitted with an earth leakage trip, operated by very small currents, in which the necessity for low resistance earth connections is eliminated. Even with excessive resistance in the earth circuit, *e.g.*, 1,000 ohms, the circuit-breaker is opened with a fault current of about 20 mA, without any potential in excess of 40 V momentarily appearing upon the casing.

The tools are earthed and fed through three-pin plugs and sockets in the ordinary way, but the earth wire from the socket is passed through the earth tripping arrangement in the circuit-breaker before being taken down to the permanent earth connection. This may have almost any resistance, as the devices will operate in some cases if the earth wire be merely laid on damp concrete, or even with broken earth wires where dampness provides a sufficient path between the ends.

The advantages of this system are that, first, no damage can possibly be caused to even the most delicate motor by an earth leakage fault of 25 mA, and, secondly, protection is quite independent of abuse of the circuit fuses. Furthermore, the whole earth circuit, from the tool down to the main earth connection, can be quickly tested.

A push-button on the breaker tests the main earth connection, but the automatic test of the whole circuit can be arranged in several ways. One is by fitting an emergency stop button near the mechanic's thumb, which connects one of the line wires through a high resistance to the earth wire. This has the effect of passing a small artificial earth leakage which trips the switch and renders the circuit dead. This test button can be used instead of the ordinary switch for stopping the tool.

A shock from the connecting lead cannot be harmful as the circuit is opened immediately; some engineers abroad test the system by grasping one live terminal of a 380-V motor and its frame. All the defects of earthing by ordinary methods are eliminated by the use of this system, which is applicable to all sizes of motors, but more especially to small portable motors, to which heavy fault currents would cause damage.

These devices are compulsorily utilised (to the extent of over 100,000) on the largest supply system on the Continent, and are available in this country also.

Finally, in the interests of continuous service, interlocked switch plugs should not be used with portable tools; it is desirable that there should be some method of opening the circuit in the event of switch-action failure. It is better to allow the plug to be dragged out of its socket by the careless mechanic rather than that the electrical connections should be ripped away from either the tool or the plug.

New Electrical Society

A new association to be known as the Motherwell and Wishaw Electrical Society, has been formed and will have sections for consulting engineers, contractors, manufacturers, supply authorities, and factors. Mr. W. D. Brassington, burgh electrical engineer of Motherwell and Wishaw, has been elected president, and Mr. Gibson, 66, Mill Road, Motherwell, is secretary.

Rational Costing. By N. F. T. Saunders, B.Sc., A.M.I.E.E.

The true relations between overhead and labour charges

WITH the change in the political situation, the fall in sterling, and the imposition of tariffs, a welcome stimulus has been given to the manufacture of electrical goods, more especially domestic appliances. It does not, however, follow that manufacturers will be able to dispose of an increased output at higher prices, or even at present prices. In the first place the increased demand is mainly that of the market which hitherto has absorbed foreign goods—generally cheaper than the home-produced equivalent—and in the second place the purchasing power of the market is falling.

This increased business may be divided broadly into two classes: first the increased demand for home produce due to the absence or prohibitive price of the foreign equivalent, or to the success of the "Buy British" campaign; and, secondly, the demand from concerns who have been factoring foreign goods, for bulk supplies of similar products.

[*Hudson Studios, Birmingham.*

Mr. N. F. T. Saunders, the author of this article, is a member of the staff of the G.E.C. Works, Witton

In order to obtain the first class of business the manufacturer will be obliged to reduce prices to the level of the foreign prices of some months ago; and when it comes to the second he will find he is dealing with people who know exactly what they want and exactly how much they are prepared to pay for it. In either case then, price is of primary importance, and any manufacturer who hopes to profit by the situation must realise that he will be faced with cut prices in every direction.

Prior Knowledge Essential

The estimation of the probable cost before production and the determination of the actual cost afterwards, are of even more importance than the question of factory organisation. In fact, unless accurate pre-costing is available it is impossible to decide on the most profitable factory organisation. Again, since time is also of extreme importance, most manufacturers will have to rely on their costing system to show them how to make the best of what equipment they have, and be content with employing more labour and adding what machinery they can obtain at short notice. Anything in the way of new factories built on the latest mass-production lines is out of the question.

In brief, it is a question of making hay while the sun shines, and each manufacturer must ask himself whether his costing system is sufficiently reliable to enable him to accept or reject with confidence and despatch each proposition as it comes his way.

The important factors of a costing system are first that it should fit the actual facts of the case and so give reliable figures and, secondly, that it should automatically force the factory management to adopt the most economical organisation. The usual costing system, as outlined below, is unsatisfactory in that it fails to meet adequately either of these conditions.

An Unsatisfactory System

The various operations required to produce each component part of an article are detailed out, and against each are given the three primary charges, labour, material and overhead. The material charge is generally the cost of the material involved plus a small percentage to cover handling and storage. The labour charge is the wage amount which will be paid to the operative, and the overhead charge is invariably expressed as a percentage on the labour figure.

The method of wage payment varies, but generally the workers are paid either on a straight piecework basis, or a "task" basis (*i.e.*, a definite time is allowed for an operation). There are also certain wage amounts which must be paid irrespective of output, but in any case the actual labour cost of an operation can be established with considerable accuracy and it is not proposed to offer any suggestions in this direction.

The real source of unsatisfactory costing is the method of apportioning the overhead charges.

Differential Costing

Since the overhead expenses comprise such items as cost of buildings, plant, taxation and salaried staff, it is obvious that the actual overhead expenses involved in any individual operation depend on the particular part of the factory in which it is performed, the length of time it occupies, and the cost of the salaried staff involved in supervision, organisation, and incidental technical work.

These expenses vary tremendously for different classes of work. The winding of a turbo-alternator stator, for instance, requires considerable floor space in an expansive building, and it involves heavy expenses in drawing office, design, shop supervision, inspection and test salaries, besides being, unfortunately, a class of work which appears on the order book at infrequent intervals and necessitates much staff work in preliminaries.

The winding of a desk fan armature, to go to the other extreme, need occupy only a few minutes in a cheap building, and the technical expenses being distributed over thousands of precisely similar articles, are a minimum. Further, with efficient organisation, it is possible to keep a steady flow of this type of work going through the factory, so that expenses on account of idle plant are negligible.

In all probability it would be impossible to find a factory of any size, turning out a variety of products, in which a uniform overhead charge is levied throughout. It would, however, be quite easy to find one in which the differentiation amounts to no more than three or four different percentages, although the size and variety of the output demands something like three or four hundred different percentages for accurate and reliable costing.

Justification of the Expense

This state of affairs is due to the belief that extensive differentiation is not worth the cost involved. There must, of course, be a limit, beyond which the cost of clerical staff exceeds the profits resulting from thorough differentiation, but there are probably few factories in which this limit is within sight. Possibly some difficulty is experienced in appreciating the value of this elusive "profit," while a large costing staff represents a financial eyesore; but a little consideration will show how necessary thorough differentiation is.

Cases constantly arise in which, for commercial reasons, it is advisable to avoid delay in the production of an item by transferring it to another section of the factory. Unless the costing system shows the real difference in the cost of production resulting from the transfer, it is impossible, with any degree of confidence, to balance this against the advantages on the commercial side. Again, unless overhead expenses are fairly differentiated, the tendency is to purchase more and more expensive automatic machinery, and thus create expanding overhead expenses which are always ahead of charges.

Method of Charging Overheads

For convenience in costing it is necessary to adopt some method of charging the overhead expenses involved against each operation. The method invariably used is that of reducing them to a percentage on the labour charge. This method, while being more or less convenient, so obviously leads to incorrect results that its universal popularity is a matter for some astonishment.

For instance, consider a case which is typical of the present situation. A manufacturer is offered a large order by a concern hitherto factoring a foreign-made article, provided he can get down to a certain price and commence delivery immediately.

On consulting his costing department and his works manager, the manufacturer finds he is in a predicament. In order to produce at the price, the costing system demands the cheapest possible labour. On the other hand, in order to meet delivery the cheapest possible labour (girls, 14 years of age) cannot be employed because in the first place it is scarce, and in the second it is normally only available at certain periods of the year (ends of school terms).

The costing systems might show that for a certain important operation the cost when girls of 14 are employed is:—

Example 1.—(*a*) Labour 1s., plus 100 per cent. = 2s.

For girls of 16 years it might show:—

(*b*) Labour 1s. 8d., plus 100 per cent. = 3s. 4d.

The works manager might then suggest that if the older girls are employed the rate can be cut. The cost then becomes:—

(*c*) Labour 1s. 3d., plus 100 per cent. = 2s. 6d.

In actual fact, however, the true costs should be more nearly :—

(*a*) Labour 1s. 0d., plus overheads 1s.=2s. 0d.
(*b*) ,, 1s. 8d. ,, ,, 1s.=2s. 8d.
(*c*) ,, 1s. 3d. ,, ,, 1s.=2s. 3d.

Or, if the effect of increased turnover in overhead costs be taken into account :—

(*d*) Labour 1s. 3d., plus overhauls 9d.=2s.

Thus more expensive labour working at a greater rate might easily result in a lower factory cost, whereas the usual costing system shows that it will be higher unless the rate of production can be increased more than in proportion to the higher wage, which can scarcely be expected.

In the case under consideration then, the manufacturer, finding that his costing system prophesies a loss at the price demanded, is forced either to refuse the order or else to use his common sense and disregard his costing system.

The Effect of Abnormal Hours

Consider now the case of overtime, shift and week-end work. Working abnormal hours is usually only resorted to as a means of avoiding a loss consequent upon delayed delivery, and is undertaken with the knowledge that a factory " loss " will be incurred. Provided, however, that sufficient work is still available for normal working hours, a factory may work abnormal hours at a profit instead of the loss which the usual costing system will show.

In such a case all overhead expenses are covered by the charges levelled on production during normal hours. If now, abnormal hours are resorted to in order to handle a greater output, the only overheads involved during these abnormal hours are those necessary to cover the cost of extra lighting, power and maintenance. So that, in actual fact, although the labour cost may be higher, the total factory cost may be lower than that for normal hours.

For example, the cost of a certain item when girl labour is employed during normal hours might be :—

Labour 2s., plus 150 per cent. (for overheads)=5s. 0d.
Material 2s., plus 8 per cent. (,,)=2s. 2d.

Total factory cost ... ... =7s. 2d.

If now, in order to handle a greater output, a night shift is proposed, it will be necessary to employ youths 18 years of age and the " cost " might then be :—

Labour 3s., plus 150 per cent.=7s. 6d.
Material 2s., plus 8 per cent.=2s. 2d.

Total factory cost ... =9s. 8d.

This shows an increase of 35 per cent., leading to the entirely erroneous conclusion that a night shift would involve a loss.

In actual fact the overhead expenses for normal hours would be the same for youth labour as for girl labour, so that the overhead charge should still be 3s., but added to this is the fact that for abnormal hours the overhead expenses involved might be only 20 per cent. of those for normal hours, so that the night shift cost should be :—

Labour 3s., plus 20 per cent. of 2s.=3s. 5d.
Material 2s., plus 8 per cent. ... =2s. 2d.

Total factory cost ... ... =5s. 7d.

showing a saving of 22 per cent. on the normal cost.

The Rational Basis

Overhead expenses are essentially a function of time. Consequently they should be covered by a charge levied on a time basis. In most factories work is already organised on a task system, and it is found that a fair time allowance for an operation can be established conveniently and accurately.

The overhead expenses should be covered by a charge based on the time allowed for an operation instead of on the wage earned by the operative in that time. This method of charging the overheads against an operation is not only more convenient, but, inasmuch as it removes the objections already raised, is more accurate than the percentage on labour method.

The factory having been divided into sections—since differential costing is necessary whichever method of charging the overheads is used—the total overhead expenses to be borne by any individual section are divided by the normal working hours and the normal number of workers in that section. This then gives an overhead charge on a time basis, or reducing it to a charge per minute and allowing 20 per cent. for contingencies (" idle time," &c.), we get for example :—

Section 1 :

Total overhead expenses per week ...	£980
Number of wage-earning workers ...	100
Normal hours worked per week ...	47

$$\text{Overhead charge} = \frac{£980 \times 240 \times 1.2}{47 \times 60 \times 100} = 0.1\text{d. per worker-minute.}$$

For any operation performed in this section, the overhead charge would be given by the time allowed multiplied by 0.1d.; it would thus be independent of the wage earned by the operative and would bear a true relationship to actual fact.

The overhead-time charge levied during abnormal hours would, of course, be less, always providing there is sufficient work available for normal hours. Work undertaken during abnormal hours, for the purpose of increasing output, would bear this reduced charge. Work so undertaken for reasons of avoiding delay in delivery, &c., would only bear this charge if other work were available to take its place during normal hours, otherwise it would bear the full charge of 0.1d. per minute.

Returning now to Example 1 we should have :—

	Time allowed.	Labour.	Overhead.	Total.
(*a*)	120 minutes.	1/- ...	1/- ...	2/-
(*b*)	120 ,,	1/8 ...	1/- ...	2/8
(*c*)	90 ,,	1/3 ...	9d. ...	2/-

It will be seen that the overhead-time charge system automatically compensates for departures from steady workshop routine. In cases where the type of labour normally employed is not available, the true result of employing alternative labour is immediately shown. The effect if the alternative labour is capable of greater or less output, per unit time, and the change in rate of production required to avoid an increase in factory cost when more expensive labour is employed, are similarly shown.

Fluctuating Output

A valuable advantage of the proposed overhead-time charge system is the ease with which the basic figure may be adjusted to a fluctuating output. In the electrical manufacturing trade at any rate, a factory rarely has a steady load for a long time. The volume of work tends to fluctuate, and, therefore, the overhead expenses as a proportion of the factory cost must fluctuate. In most factories the number of workers employed varies with the volume of work as a matter of course. In the usual costing system, adjustment of the overhead charge percentage is a difficult and involved operation with which the costing staff is often unable to cope. Consequently the figure remains unchanged over long periods of time.

This action is defended on the ground that over a long period a balance is struck. The fact remains, however, that frequent adjustment of overhead charges in inverse proportion to the volume of orders acts both as a spur and a reward to the commercial side, since, of course, it is highly improbable that the selling price will vary accordingly. The overhead-time charge must be varied inversely as the worker-minutes, or if the working time is kept constant, inversely as the number of workers.

Thus in a section which has a charge of 0.1d. per minute for normal working hours based on the employment of 100 workers, should the number of workers be reduced to 80 the charge will become :—

$$0.10 \times 1/0.8 = 0.125\text{d.}$$

while, should the number increase to 120, it will fall to :—

$$0.10 \times 1/1.2 = 0.083\text{d.}$$

It is clear, therefore, that as the number of workers employed in the section is a factor easily and instantly available, the correction of the overhead-time charge is quite a simple matter.

Economic Effects

Finally, and this is perhaps not an unimportant consideration, two economic effects would result from a wide adoption of the suggested overhead-time charge costing system. First, manufacturers would have more confidence in their cost figures and would be able, with greater ease, despatch and certainty, to come to decisions with regard to quoting for, or accepting, business. Secondly, it would have a tendency to check the urge towards the employment of the cheapest possible labour.

Most employers would agree that the employment of young girls who should still be at school, in place of adult workers who thus join the ranks of the unemployed, or placing a valuable machine in the charge of a semi-skilled youth instead of a skilled and responsible man, are actions to be deprecated. Again, common sense would tell a works manager that having reached the costing department's ideal, and filled his works with juvenile workers, he would still find cheap production eluding him.

Surely, then, a costing system which offers no alternative to such perverse actions as these should be rejected in favour of the suggested system which would not encourage them. And it may well be that such small influences as these two are just those required to form the nucleus of the long awaited snowball of prosperity.

A Modern Nursing Home

Electric cooking in a hotel for the sick

ONE of the most remarkable nursing homes in this country, if not in the world, is nearing completion between Devonshire Place and Harley Street. It is claimed by the Duke of Atholl, the chairman, to be the finest in size and equipment yet built.

The poor have at their disposal in the great public hospitals modern equipment and the services of specialists, but those institutions do not in general cater for private patients.

It is to make similar advantages available to a large section of the middle class and well-to-do that the London Clinic and Nursing Home has been built, the aim being to provide the best nursing home treatment at a moderate cost.

The new building occupies a 2-acre site, has ten floors, and comprises 1,000 rooms. There will be accommodation for some 214 patients in single rooms and suites, which will be graded according to degree of luxury somewhat after the style of hotel practice. A whole floor is to be devoted to maternity cases and the home will contain seven surgical theatres, each decorated in different colour schemes according to the personal desires of the specialists who will operate in them.

Suites of rooms in the new home have been retained by thirty-six consultants, all of whom are leading specialists in their particular branches of surgery and medicine.

The Kitchen Equipment

The kitchens of this important building are interesting, both in detail of equipment and layout, while hygiene has received special consideration.

Messrs. Benham & Sons, Ltd., were entrusted with the planning and equipment of the whole of the kitchen arrangements, the architect emphasising that it should be done on hotel lines, since the building is, in point of fact, a hotel for the sick. Cooking equipment had to be provided for 200 patients, or 350 people including patients, nurses, domestic staff, and doctors.

The kitchens and sculleries are on the ground floor of the building and are directly accessible to the goods loading dock. The kitchen proper is 104 ft. in length and 48 ft. in width, and comprises, at one end, milk store and vegetable scullery, chef's office, meat and fish preparation rooms, and the main cooking appliances.

For the purposes of this installation three methods of heating have been adopted. The main equipment includes a large double-compartment electric roasting oven of 32-kW capacity, a two-pan electric fish-frying range loaded to 15 kW, and a 6-kW electric griller, together with several steam- and gas-heated appliances and stainless steel working tables.

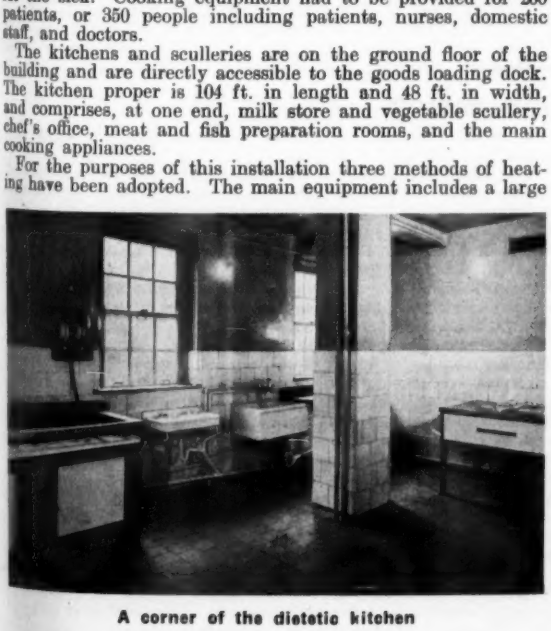
Adjoining the principal kitchen is a smaller one in which pastry is made and baked; the two-deck electrically heated pastry oven has an 8-kW loading.

Dietetic Kitchen

There is a small separate apartment used for the preparation of foods and dishes required for special diets. Its principal cooking appliances are a double-oven electric gas range in which the ovens are electrically heated, the hot-plate top being gas heated and including an electric grill and steam-heated diet cooker. (A small refrigerating cabinet is also embodied in it.)

The electrical load of the cooking appliances in the kitchen is 111 kW, and that of the doctors' and secretaries' dining rooms and serveries on the various floors is 37 kW.

Two views of the spacious kitchen of the new London Nursing Home and Clinic



A corner of the dietetic kitchen

The Main Servery

This consists of a special bow-shaped heated fitting with surfaces of enamel and stainless steel. Incorporated in it are a hot cupboard with two carving wells over it, a bain marie, service tables at each end, and a pressure-type water boiler with coffee and milk urns. Facing the concave side are six service lifts together with a 10-ft. stainless-steel service table. Heated food containers are provided in the service lifts, so that no heat is lost in the transit of hot foods between the kitchens and the seven floors of the building. On each floor there is a duty room and servery, each of the latter being fitted with an electric hot cupboard, water boiler, sink, refrigerator, &c.

Other departments connected with the kitchen scheme include " left-over " larders, glass, china and silver rooms, bread room, pot and vegetable sculleries, dry store and manageress's office. In the crockery scullery a mechanical dishwasher has been fixed, but it is in the basement that patients' food containers are washed, sterilised and labelled. There is also a cold storage installation with a cold room for meat, game, &c., in the basement.

For ventilating the kitchen Messrs. Benham have installed a mechanical exhaust system which prevents cooking smells, fumes, and vapour from penetrating into the building; also it reduces the temperature, particularly in the preparation rooms.

A feature of interest connected with this contract is the finish of the equipment throughout. It consists of all-enamelled or stainless-steel surfacing of appliances and chromium-plated fittings, such as swing-arm cocks, handles, chains, &c.

Legal

Claim for Electrical Installation

Mr. G. A. Scott, an Official Referee, had before him last week an action by Anderson, Angel & Co., of Paul Street, E.C., against Mr. H. Edmunds, of Philbeach Gardens, Kensington, to recover the sum of £116 11s. 5d. for work done and material supplied in connection with a complete electrical installation at the defendant's house. The defence set up was that the work was worthless and the charge excessive, and defendant also counterclaimed for £132 for alleged defective work. The plaintiffs denied the defendant's allegations.

The Official Referee, after hearing the evidence and legal argument, said the defendant had pleaded that the action was wrongly brought, as Mr. H. B. Angel, who traded in the firm name, could not sue as a firm. The plaintiff had asked permission to amend by substituting Mr. Angel's name and then following it with the firm's name. The Official Referee allowed this and found that the plaintiff's claim had been proved. He gave judgment for the amount claimed with costs and dismissed the defendant's counterclaim. Notice of appeal was given by the defendant.

Sequel to a Fire

In the King's Bench Division recently Mr. Justice Wright commenced the hearing of an action by Messrs. Geo. West, Ltd., and the Express Rubber Co., Ltd., against Messrs. Griggs & Son, building contractors, claiming £25,400 in respect of damages resulting from a fire. The defendants denied that they had been guilty of negligence or that the electric wires they had put in the premises were defective.

Mr. Croom Johnson, K.C., for the plaintiffs, said that the plaintiffs' business was that of manufacturing waterproofs and raincoats and other articles of a highly inflammable nature, and that the origin of the trouble was that temporary electric wires, erected for works purposes in adjoining premises, were connected with the electric main through the felt-covered timbers or partitions without protection.

Evidence was called in support of the plaintiffs' case and the hearing was adjourned.

When the case was resumed on the following day the defendants denied negligence and alleged that the fire was due to causes over which they had no control.

For the plaintiff Col. Cuthbert Buckle, fire insurance assessor, said that insulation might have got unbraided and this with wet or dirt in it might have set up a conducting bridge. On the other hand a nail might have short-circuited the conductors. If the bridge were not a perfect conductor the heat and ultimate arcing would cause fire.

Mr. James Swinburne also gave evidence. The hearing was again adjourned.

A Radio Valve Patent Matter

In the Chancery Division, on January 26th, Mr. Justice Eve had by him a summons in the action by the Mullard Radio Valve Co., Ltd., against Tungsram Electric Lamp Works (Great Britain), Ltd., issued by the defendants, asking for further and better particulars of plaintiffs' amended particulars of breaches in a patent action by the plaintiffs against the defendants.

Mr. Whitehead, K.C., for the defendants, stated that the action was one in which the plaintiffs were saying that the defendants were the importers of wireless valves and alleging that there had been infringement by the defendants of four of the plaintiffs' letters patent. Each of the four patents in question was concerned with the manufacture of cathodes. There were many types of alleged infringement, and defendants wished for more specific particulars, otherwise they would be put to enormous expense.

Mr. Moritz, K.C., for plaintiffs, said the defendants were only the importers of the valves, which, he was instructed, were manufactured in Hungary. The subject of the four letters patent was only the filament, and the plaintiffs alleged that the defendants' filaments infringed one or other of plaintiffs' four patents. It would not cost defendants much to say what it was, because they could tell, but plaintiffs could not. His clients were anxious to bring this action to trial.

His Lordship reserved judgment.

A Motor Sales Dispute

Mr. Justice Maugham, in the King's Bench Division, on January 22th and 25th, heard an action by Messrs. Pooley & Austin, Broadway, S.W., against Vac-Tric, Ltd., Waterloo Road, North Circular Road, N.W., for a declaration that by an agreement made between the parties in February, 1929, the plaintiffs were entitled to a commission of 7 per cent. on all moneys received by the defendants in respect of orders from Messrs. Creed & Co., and that the defendants were not entitled to reduce this commission to 3½ per cent. They also claimed damages.

The plaintiffs' case was that they were appointed sole selling agents of the defendants in a certain district for the sale of electric dynamos and fractional h.p. motors. The agreement was terminable at three months' notice. In November, 1930, the plaintiffs alleged, they obtained an order from Messrs. Creed & Co., but the defendants refused to pay the 7 per cent. commission, and instead decided to pay 3½ per cent. commission only. The plaintiffs alleged that this was tantamount to a repudiation of the agreement.

The defendants denied breach of agreement, and by counter-claim alleged that the plaintiffs had neglected to canvass for orders for their products. They also stated that the plaintiffs, in competition with them, had supplied goods which they (the defendants) should have been asked to supply. They accordingly claimed damages for this alleged breach of the agreement.

Mr. Justice Maugham said that, so far as he could see, there was no sign of fraud on either side, and the case was capable of being brought to a conclusion satisfactory to both parties.

After Counsel had seen the Judge in his private room it was announced that it had been agreed that there should be judgment entered for the plaintiffs for £1,050, with costs, and that the defendants' counter-claim should be dismissed, with costs. Defendants' Counsel stated that he made no charge of want of good faith on the part of the plaintiffs.

Mr. Justice Maugham said he thought that the parties had arrived at a very reasonable settlement.

An "Evenly Balanced" Case

At the Clacton County Court on Tuesday last Mr. A. Cousins (formerly trading as the Universal Lighting Co.) sued Mr. D. Alberts, Clacton, for £10 2s. 6d. balance of account for work done and goods supplied.

It was stated for the plaintiff that he had supplied Philips lamps and reflectors for the defendant's premises on approval and that the defendant's manager had stated that they were going to be retained; they were in use for three months and the plaintiff was then instructed to take them down and store them until the next season. Later the defendant said that the reflectors were to be taken back by plaintiff; the latter wrote to the manufacturers who refused to take them back.

Evidence for the defence was to the effect that the reflectors had been installed for demonstration purposes and that there was no obligation to purchase them.

The Judge considered that the case was evenly balanced, and in giving judgment for the defendant said he would have been glad of assistance from the manufacturers of the reflectors.

Cathedral Illumination

IN designing a system of electric lighting for a cathedral regard must be paid to the preservation of all the architectural features, and the wiring must not cause damage or disfiguration. How successfully this has been accomplished in the case of Ripon Cathedral will be appreciated from the fact that not a single light source is to be seen, neither is there any trace of the wiring.

In the nave, at clerestory level, some 60 ft. from the floor, eighteen 500-W "Gecoray" floodlights are concealed behind the pillars and directed eastwards at an angle of approximately 45 deg. They are so spaced that the entire nave area is flooded with a mean intensity of approximately five ft. candles at pew level and seven ft. candles up the centre aisle. This lighting serves, at the same time, to illuminate the aisles, where it is augmented by a similar number of 150-W floodlights concealed behind the apex of each of the pointed arches.

In the north and south transepts, mounted 90 ft. from floor level, are 200-W reflectors, and twenty-six floodlights are installed in the choir stalls and chancel. The maximum radiating on the centre of the chancel is 5.5 ft. candles; the clergy seating accommodation has a maximum of eight foot candles; while the choir-stall illumination ranges from three to five-and-a-half ft. candles, the latter intensity also applying to the altar.

The library, chapter room, and vestries are all equally well lighted, as also are the ancient St. Wilfrid's Chapel and the Saxon and Norman crypts. Special flexible brackets equipped with shell reflectors and pearl lamps adequately light the organ.

The library and vestry are illuminated by pendants of special design with "Superlux" shades, while in the Chapter House a central lamp in an inverted shade supplies the general lighting, and an iron standard equipped with two bracket arms carrying "Superlux" globes is arranged on one switch for table lighting. In addition, there is a system of pilot lighting throughout the building which illuminates the various stairways to lower ground levels, to the belfry, organ loft, and other offices.

The entire scheme was designed by the Illuminating Engineering Department of the G.E.C., and the whole of the material, comprising fittings, lamps, &c., used by Messrs. F. & D. Gillyard Beer, of Ripon, the contractors, was of G.E.C. design and manufacture.

A dual three-phase balanced supply feeds the cathedral; a specially designed ironclad switchboard serves three distribution boards, and a secondary mains service is utilised for power and lighting for the organ, for the motor for the heating system, as well as for the lighting of the crypts, pulpit, and lectern, library, chapter house and vestry. Each board is made up in a steel case containing Home Office pattern "Junior" G.E.C. double-pole fuses and "Landor" Bakelite switches, the whole board being cased in oak to match the general woodwork of the surroundings. The wiring is encased in "Magnet" welded screwed conduit.

MEETINGS AND DISCUSSIONS

Current Topics and Opinions Expressed at the Institutions

Where the Alkaline Battery Leads

ALKALINE batteries, with special reference to the nickel-cadmium type, was the subject of the paper which Messrs. D. W. T. Kirkman and F. Watson Mann read before the RUGBY ENGINEERING SOCIETY on January 27th.

Although this kind of accumulator is finding an increasing number of applications, the amount of information available about it is very limited. A recent development is the Drumm cell. Two distinct types are being manufactured commercially; they are the nickel-iron type, frequently referred to as the Edison type, and the nickel-cadmium Jungner type.

The construction of both is essentially the same in principle. The active material is enclosed in steel tubes which are perforated with a very large number of minute holes over the whole of their surface, a number of these pockets being assembled into steel retaining frames to form complete positive or negative plates.

The electrolyte is a solution of pure potassium hydroxide having a normal specific gravity of about 1.19. The strength of the solution, apart from evaporation, does not vary during either discharge or charge and there is no possibility of any internal corrosion. Because steel is used throughout in the construction of the cell all parts can be made with mathematical precision and the mechanical strength, durability, and robustness are much in advance of what can be obtained even in the best designs of lead cell.

Ripon Cathedral before and after the installation of the new lighting arrangements. (*See opposite page.*)

In both types the active material in the positive plates is nickel hydroxide, the action that takes place on discharge being a reduction from a higher to a lower form, and vice versa on charge. In the nickel-iron cell the active material in the negative plate is metallic iron, which is oxidised on discharge to iron oxide (or hydroxide), and vice versa on charge, while in the nickel-cadmium cell the iron is replaced by cadmium.

The high electrical resistance of the actual active materials has been overcome in various ingenious ways. In one example, the nickel hydroxide is mixed with flakes of pure nickel 1/16 in. square and 0.00004 in. thick, the method being to have alternate layers. Another method is that of mixing the nickel hydroxide intimately with a specially prepared flake graphite, which is chemically inert. In the nickel-iron cell the high resistance of the iron oxide formed on discharge is overcome by mixing the material intimately with about 6 per cent. of yellow mercuric oxide.

The theoretical discharge voltage of the cadmium negative plate is roughly 0.03 V lower than that of the iron negative plate. This is, however, more than counterbalanced by the lower resistance of the cadmium plate and the resulting voltage on discharge is actually slightly higher, particularly at higher discharge rates. The charging voltage of cadmium oxide is very much lower than that of iron oxide and this is one of the more important advantages of the cadmium plate. The voltage required for the conversion of the oxide to cadmium (with a nickel hydroxide positive plate) is from 1.35 to 1.5 V, while that for converting oxide to iron is 1.55 to 1.8 V.

The chemical reactions occurring in alkaline cells are extremely involved and the electrolyte appears to take no active part in the reactions, but to function merely as a conductor. Apart from considerations of temperature rise and alteration in gravity due to electrolysis on charge, the quantity of electrolyte can thus be reduced to the minimum and the plates placed very closely together. Although oxygen plays a part in the reaction, being transferred from one plate to another, no free oxygen is liberated on discharge, and therefore as no gases are evolved, a nickel cadmium cell can easily be made completely unspillable by the fitting of solid stoppers.

The charging voltage of a pure nickel cadmium cell is from 1.35 to 1.50 V, compared with 1.55 to 1.80 V for a nickel iron cell, and the open circuit voltage of both types is between 1.30 and 1.40 V. A nickel iron cell cannot be charged at very low rates and, on account of the large variation between charge and discharge voltages, cannot be "floated." The nickel cadmium cell, however, can be trickle charged, or "floated," in a similar way to the lead cell. The internal resistance of both types is appreciably higher than that of a lead cell. The nickel cadmium cell's internal resistance is only about half that of the nickel iron cell.

The rest of this long paper explains how the characteristics of these cells make them suitable for particular applications.

Can the Agricultural Labourer Afford It?

IN a paper read before the OVERHEAD LINES ASSOCIATION on January 20th, Mr. J. W. C. Neave, of the Aylesbury Electricity Department, outlined some of the principal difficulties encountered in dealing with rural electrification.

The area which could be effectively controlled from a central office appeared, he said, to be about 250 square miles and for such an area 11,000 V was ample. It was debatable if the correct thing was being done in adopting three-phases for rural distribution in all cases. Certainly in areas where there was no possibility of large power use, it would be well to consider the advantages of the single-phase system, which was quite satisfactory for small power. In the Aylesbury district, where both systems were in use, single-phase was found more satisfactory.

The author thought that the regulations of the Electricity Commissioners were hindering rural development, and he made the following suggestions:—(*a*) In the case of e.h.p. lines following hedges or over rough pasture, the 20-ft. clearance could be 16 ft., and the lines would still be out of reach; (*b*) danger notices and barbed wire should be abandoned, as people were so used to power lines that no fear of accident need exist; (*c*) the regulations dealing with the factors of safety of line conductors should be revised, since the worst conditions of simultaneous ice and wind loading, upon which the regulations were based, never occurred here; (*d*) the use of duplicate insulators for railway, telephone, and canal crossings, and also where lines were alongside roads, should be discontinued; the almost unheard of occurrence of line breakage did not warrant their use; (*e*) where l.p. lines ran along hedges where no trees existed 12 ft. instead of the present 15 ft. would appear ample.

It was useless to expect a farm labourer earning 35s. per week to install an electric cooker, but it might be possible to convince him that electricity for hot water and for lighting, ironing, &c., was economical. The employment of a local man for canvassing had been found desirable. The method of charging in the Aylesbury rural area was 1s. per annum for every 10 sq. ft. of the base area of the house, plus 1½d. per kWh for all electricity used for domestic purposes.

The rural supply had been given for six years, the cost last year being £38,270 against a revenue of £37,440, a loss of £830; but it was contended that the total profit on the whole undertaking, town and rural, of £4,105 last year would have been much less had there been no rural supply.

Lightning had been the worse trouble with regard to continuity of the h.p. supply, but, although several fuses had blown in storms, the transformers did not appear to have been damaged.

Motor transport was the greatest difficulty with regard to maintenance, its annual cost in Aylesbury being £1,000. When distances of 10 or 15 miles had to be travelled, a cooker fault

necessitated 30 miles of travelling and thus the repair became very expensive.

Opening the discussion, Mr. W. Fennell said that he had been employing single-phase rural distribution for six or seven years and had yet to come across any serious objection to it. Single-phase motors up to 25 h.p. were used without difficulty, although they cost a little more. He did not use much three- or four-wire distribution in the country, because with high-pressure single-phase transmission it was possible to get there cheaply enough to avoid long lengths of low-pressure distributors in the villages. He advocated the erection of a transformer within not more than 200 yards of several consumers and then "hop" from chimney to chimney within the 200 yards radius of the transformer. He thus distributed at 200 V, but the lines were really services.

Supply authorities were getting tired of the difficulties of obtaining wayleaves; he advised refusal to give a supply when such difficulties existed. In the case of the Post Office, also, it was better, in case of difficulty, to refer the matter to the Electricity Commissioners and ask them to give a decision.

There was always a chance of getting cookers installed in labourers' houses if the apparatus was hired at a reasonable rental.

CHARGES TOO HIGH

Mr. B. G. Drummond asked whether commutator machines or ordinary induction motors were used at Aylesbury.

Mr. J. M. Kennedy remarked that the increased cost to the consumer when single-phase distribution was adopted seemed to him a very pertinent argument against the system. A large consumer situated at some considerable distance from the transforming station was very difficult to balance, and he did not think a light steel middle wire would do in such a case. The kWh charge of 1½d. in Aylesbury, together with the high standing charge on the house, was much too great. The kWh charge should be reduced to ¾d. and later to ½d.

Mr. G. Molle (hon. secretary) said that there were few districts now in Great Britain where there were no members of the Association and, having regard to this extended influence, he hoped that the recommendations made by the O.L.A. to the Electricity Commissioners for the amendment of the overhead lines regulations would soon receive careful consideration.

Mr. C. F. Mounsdon, speaking of giving service in an area 10 or 15 miles away from headquarters, said he had found it pay to have a local man resident in those places who was capable of doing wiring work, handling inquiries, and generally doing service work, thus saving headquarters the expense of sending a man specially to deal with repairs.

Mr. C. W. Salt wondered whether it was possible to arrive at a formula which would show approximately if a given area was likely to pay. Such a formula must include three dominant factors, the size of the area, the population in the area, and the rateable value.

Mr. H. W. Grimmett did not think anybody would want to reduce the factors of safety of line conductors, because it would mean serious vibration, especially with light high-tensile conductors. The 1½d. charged at Aylesbury was too high on a two-part tariff; if that were reduced there was every probability that a profit would be earned.

SINGLE-PHASE PREFERRED

Mr. W. A. Turnbull said that the charge was reduced to 1d. for water heating, but even 1½d. for cooking was not exorbitant for the conditions. It would be impossible to reduce the charge to ¾d. or ½d. if anything at all was to be obtained from the cooking units towards capital charges. Single-phase was used in the Aylesbury area for villages; for the larger places, some of which had a population of 5,000, three-phase supplies were given when first introduced some years ago, but to-day he would use single-phase. It was possible to get a much better balance on two circuits than on three. Single-phase motors up to 10 h.p. were being used and a 5 h.p. motor cost about £4 more than a three-phase one.

The Author, replying to the discussion, said the bad starting of single-phase motors had been overcome by the use of a loose pulley incorporated with the machine at very little extra expense. The low power factor was not really a difficulty, although it put the cost of supply up a little, especially when that supply was being bought on a kVA basis. Induction motors were quite suitable; the commutator motor was more expensive; the induction motor, once speed was attained, was very satisfactory. A supply was not given to a village in the Aylesbury area unless there was a certainty of a return equivalent to 20 per cent. on the outlay.

Thermal Storage Needs Appropriate Tariffs

IN certain Continental countries suitable off-peak loads have been fostered and the consequent improvement of load factor has been remarkable. The apparatus which has been developed for this purpose depends almost entirely upon the principle of thermal storage. Water systems are in operation in this country, but the adoption of these load-levelling devices has not been widespread and, in consequence, the apparatus is but little known.

The subject matter of a paper which Mr. K. R. Sturley read on January 26th before the London Students' Section of the INSTITUTION OF ELECTRICAL ENGINEERS was a survey of the devices now in existence. The paper includes a list of liquid and solid media suitable for such use.

STORAGE IN LIQUIDS

The heating of large buildings by water thermal-storage apparatus has been carried out in this country. The equipment may depend for its heating action upon the passage of current directly through water, as in the case of the electrode boiler, or heat may be produced by means of resistance elements immersed in and insulated from the water. The storage unit may actually be the boiler itself, or steam may be produced and passed on to a calorifier connected to a storage tank. The latter method is often more suitable in the case of large installations.

General practice seems to indicate the use of an electrode boiler in conjunction with a separate storage container where steam-raising is carried out, whilst the combined heater and storage unit is often fitted with some form of resistor circuit. Low-capacity water thermal-storage tanks for domestic use also receive treatment in the paper.

Owing to its greater useful temperature-range a given volume of oil can store approximately twice as much heat as the same volume of water. It is unlikely that central-heating systems would be operated with oil, but there are certain industrial processes in which it can be employed, notably where a temperature is required above the maximum boiling point of water.

STORAGE IN SOLIDS

The principle of thermal storage has been successfully applied in the case of large public buildings by utilising the high thermal capacity of the floor. Such a method is in operation in the Swiss Popular Bank at Zurich. Embedded in the concrete floor are metal tubes into which the heating elements, threaded through porcelain beads, are drawn. The elements are flexible and can quite readily be inserted or withdrawn. The heating of the floor is very slight; in fact its temperature is very little higher than that of the room.

For the heating of rooms of small capacity, self-contained stoves, as they are called, may assume many different forms. Heat supplied electrically by means of resistance elements is stored in some solid material, and transference takes place by convection. The storage material may be gravel, sand, stone, or cast iron.

COOKING BY THERMAL STORAGE

One type of storage cooker has a central heating element in a core of cast iron surrounded by sand. The latter is held in a perforated container and is enclosed in an air-tight case. Air is circulated through the sand and passes out through the central cast-iron core to the cooking points. From the hot plates of special grid construction the air is returned to the driving fan *via* a hot-water tank, where the rest of the available heat is abstracted.

In this country, where the average load factor is computed to be about 25 per cent., the need for some form of load-levelling device is apparent. Thermal storage can only meet with success, however, if a suitable tariff is offered. Continental generating conditions (with water as the source of power) are certainly more favourable to the adoption of thermal storage than those existing in this country. Nevertheless, it should be possible to offer a tariff of ¾d. or ½d. per kWh. Some supply authorities are now beginning to realise the significance of the off-peak load and there seems to be every prospect that the principle of thermal storage will be applied increasingly, to the advantage of consumer and supply authority alike.

Micro-Rays Will Relieve Congestion

THE development of the art of electrical communication was the subject of Mr. J. Entwistle's presidential address to the BIRMINGHAM ELECTRIC CLUB on January 22nd.

Following a historical introduction the president referred to the success which has attended the introduction of automatic telephony. The Strowger system is the standard of the General Post Office, and the rotary system is being adopted in Europe, where many countries are contemplating extensive modernisation projects. Automatic systems are, in fact, in course of installation all over the world.

The development of underground cables in place of bare-wire overhead lines and the influence of loading and thermionic repeaters on long-distance communication were referred to.

One of the first European cables embodying repeaters was commenced in 1920. It connects the cities of Stockholm and Göteborg, Sweden, a distance of approximately 530 km., and has to a large extent served as a model for later European development.

Italy, with conspicuous foresight, adopted a scheme of cable networks which will have a far-reaching influence on long-distance telephone development, and will be of great service to that country. The scheme embraces a system comprising approximately 2,550 km. of cable, by which it will be possible to speak by cable from Glasgow to Naples, *via* Paris, Basle, Zurich, Milan, and Rome, a total distance approaching 3,000 km.

Other important long-distance cables have been installed in Belgium, France, Czecho-Slovakia, Denmark, Holland, Hungary, and Switzerland. They are a valuable aid towards intercommunication between European nations. In Asia, Africa, and Australasia long-distance cables are now under consideration, and the time is not far distant when this means of communication will be in use throughout the world.

CARRIER CURRENT SYSTEMS

Another step in the direction of line economy was the development of the "composite system," which provides for simultaneous telegraphy and telephony over the same wires. The principle involved is frequency discrimination by electric filters, and the development of the three-electrode vacuum tube was followed by the introduction of the carrier system. In general it is not found economical to employ carrier-current systems on communication lines which are less than about 300 km. in length.

Wireless communication developed into broadcasting, but telephony is not limited to point-to-point conversation; it is being applied to traffic control, and such systems are in successful operation on several of the large English railways, and also on important lines in Africa, Belgium, Ceylon, France, India, Sweden, Italy, Spain, the United States, and other countries. It has also been adopted successfully for the control of street tramways in London, and a modification was adopted some years ago by the Birmingham Corporation Electricity Department for controlling the generating side of the undertaking.

INTERNATIONAL TELEPHONY

Radio telephony at the beginning of 1929 provided daily telephone service to more than twenty-six countries. During 1929 and 1930 more than twice as many new international connections were established, and the total wholly or partly effected through radio-telephony was thereby increased to 177.

The vast European toll cable network was added to during 1930 to the extent of some 6,000 to 8,000 km. of cable with about 1½ million km. of copper conductors, in addition to large quantities of loading coils and repeaters. Two new submarine cables were laid across the English Channel and one between Sweden and Germany. In Great Britain during 1930 an early cable between London and Liverpool with heavy-gauge conductors varying from 100 to 300 lb. per mile was withdrawn and replaced by a modern cable with 25-lb. per mile conductors, a change which effected large economies and a great increase in the number of circuits provided.

The International Telephone Directory, when first published in 1929, contained about 1,200 entries from 1,485 towns in twenty-seven different countries. The 1930 edition contains more than 50,000 entries from 2,718 towns in thirty-eight countries.

The increase in automatic lines in Europe during 1930 was of the order of 20 per cent. In cities where the people speak many tongues automatic telephony has a peculiar value because of the difficulty of obtaining polylingual operators, and in Europe has led to a demand for direct dialling over long-distance lines, a problem which was solved successfully during the year. Early demonstrations and tests in Dusseldorf and Brussels, when direct key-sending was successfully carried out to subscribers in the London automatic area, have been followed by the installation of permanent equipment in many countries.

PICTURE TRANSMISSION

Commercial facsimile, or picture-transmission, services are being provided for the public in Great Britain, Germany, Sweden, Japan, Denmark, Canada, and the United States. In Europe the television systems of greatest prominence are the Baird and the Mihaly. In the United States results with two-way television obtained by the Bell Telephone laboratories are most promising.

ULTRA-SHORT-WAVE COMMUNICATION

Micro-rays with usable wavelengths ranging between 10 cm. and 1 m. and the extraordinary high frequency of 1,600,000 kilocycles, possess very similar characteristics to light waves. They travel in a direct path and can be reflected or refracted by suitable surfaces and so directed accurately to any desired spot like the beam of a searchlight, though they will travel to much greater distances.

Since the range of frequencies contained within the micro-ray band now made available is roughly nine times as great as that embraced in the band now used for radio purposes, it will be possible to remove most of the commercial telegraph and telephone services from the congested medium wavelengths and free these for broadcasting. Further, the straight line characteristics of the new waves and their restricted lateral and distance ranges will enable a large number of stations to operate on the same wavelength.

The development of the micro-ray system opens up a greater range of frequencies. The lack of these in the past has tended to obstruct picture transmission by radio and restrict the use of such apparatus to wired routes.

Large electric ovens in the nursing home described on p. 155

Commercial or Experimental?

DURING the discussion at a meeting of the INSTITUTION OF CHEMICAL ENGINEERS on January 20th on a paper on "The Production of Hydrogen and Oxygen by Electrolysis at High Pressures," which was presented by Dr. D. M. Newitt and Dr. H. K. Sen, and was referred to last week, Dr. E. F. Armstrong said that the subject was one upon which research was needed. Those who used hydrogen generally had to use it under pressure, and were all looking for a cell which was more economical, which occupied less space, and, presumably, which would cost rather less than the cells used in the past. The Noegerrath cell somehow seemed not to have been developed to perfection, and one always felt some alarm lest the gases might become mixed.

Mr. A. Edgar Knowles said there was absolutely no difficulty in making a cell of any capacity for which supplies of electricity could be obtained. A plant of 6,500 kW in one battery had been installed in Canada, each cell taking 10,000 A at an average of 2.04 V. Alongside it was one by another maker with 50 per cent. larger electrode area, running at 1.8 V. Their efficiencies were exactly the same. The floor space they occupied was nothing like that mentioned in the paper.

The experiments which the authors had carried out were of little value from the practical point of view, because they had not been done with the materials one was obliged to use in constructing cells on a large scale. The electrodes were always of iron, but never of nickel; while the positive might be coated specially with nickel, the negative was always of iron, and with iron the results were totally different from those obtained with any other metal. He did not think that the conductivity and other figures the authors had obtained with sodium chloride bore any relation to the figures that could be obtained with caustic potash and caustic soda, the two solutions which always had to be used.

POSSIBILITIES OF THE NOEGERRATH CELL

Dr. H. J. Bush said that the success of the Noegerrath cell depended entirely upon the design and material. The cell built for the German State Railways had fulfilled its guarantee of a consumption of 3 to 3.5 kW per cubic metre of hydrogen, at a purity of over 98 per cent.; in fact, the purity of both the hydrogen and the oxygen was over 99 per cent. The application of these pressure cells for the utilisation of the off-peak loads of power stations was receiving attention in Germany. For example, the railway companies were considering whether they could generate hydrogen at a very low cost, so that, instead of electrifying the branch lines, they could run them with hydrogen motors. In that way they might use the pressure electrolyser as a storage battery.

Dr. H. J. T. Bellingham did not believe that it was possible to electrolyse water on a commercial scale with caustic soda without using a considerable quantity of energy to overcome the resistance of the electrolyte. He suggested that none of the information published proved conclusively that any saving of electrical energy was effected by working under pressure. Voltage saving might be offset by decreases in current efficiency.

ANODE DEPTH

Mr. E. F. Evenden was also of the opinion that the figures represented the consumption per cubic foot of mixed gas rather than hydrogen, because otherwise the voltage would be in the neighbourhood of 1.3, and that did not seem possible. No mention was made of the effect of temperature on the voltage of the cell.

The authors' cell was not intended to be commercial; it was probable that the voltage was extremely high on account of the long electrode path, and that nine-tenths of the electrolysis was taking place on the last quarter-inch of the anode.

Dr. Newitt, replying to the discussion, said that the pressures might be of the order of 200 or 300 atmospheres with practically no danger of leakage. The depth of electrodes used in the authors' cell was purposely large, because there were differences of pressure in the cells and they did not wish the electrode to be forced out of the anode chamber and the gases to mix. Dr. Newitt agreed that Noegerrath's figures must have represented the kW consumption per cubic metre of free gas; otherwise the efficiency would have been extraordinary.

Rubber Cables

A paper on "Rubber Manufacture for Electric Cables, Compared with Rubber Manufacture for Other Purposes," was given in Glasgow recently under the auspices of the Scottish Section of the INSTITUTION OF THE RUBBER INDUSTRY by Mr. J. R. M. Duncan, who said cable manufacture had many difficulties peculiar to itself, the overcoming of which entailed a tremendous amount of research and investigation. It was essential for cable insulation to ensure absolute freedom from gritty matter, otherwise a loss of physical and electrical properties would occur.

All-electric Moulding Machines

The application of electro-magnetism to foundry work

HITHERTO the electrification of moulding machines has always required a motor as a component part; the original Pneulec machine was a notable example. This machine combines electric and pneumatic action, but the magnetic moulder introduced by British Insulated Cables, Ltd., is 100 per cent. electric, and has no motor attachment.

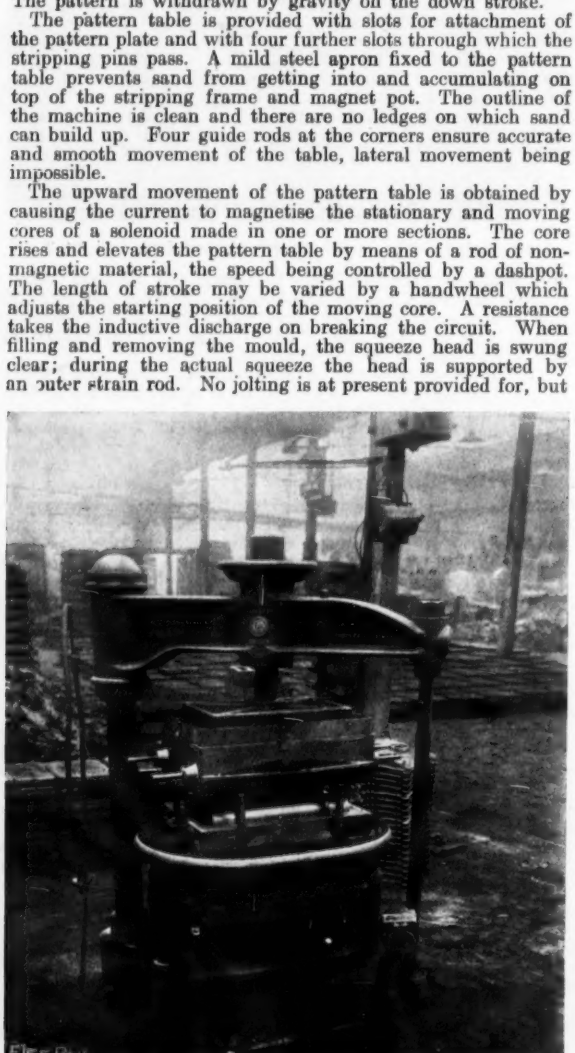
The advantages of an electrically operated machine are:—First, every machine is a complete unit and requires neither compressor nor hydraulic plant; secondly, the construction of the machine itself is simple. There are no valves, glands, packings, pipe lines, or elaborate foundations.

Low Power Consumption

A machine of the type illustrated, which is capable of producing up to 60 moulds per hour and has a pattern table 27 in. by 18 in., consumes only 42.9 A at 240 V, costing approximately 0.33d. per 60 moulds with power at 1d. per kWh. Machines are available for pattern plates varying from 324 sq. in. to 1,280 sq. in. At present, machines are manufactured for d.c. operation, but where a.c. only is available converting plant can be supplied. Since the switchgear is so arranged that only one machine can be in circuit at any one moment, a peak load of two or more machines is impossible. Power is consumed only during the actual squeeze, which takes one to two seconds. The pattern is withdrawn by gravity on the down stroke.

The pattern table is provided with slots for attachment of the pattern plate and with four further slots through which the stripping pins pass. A mild steel apron fixed to the pattern table prevents sand from getting into and accumulating on top of the stripping frame and magnet pot. The outline of the machine is clean and there are no ledges on which sand can build up. Four guide rods at the corners ensure accurate and smooth movement of the table, lateral movement being impossible.

The upward movement of the pattern table is obtained by causing the current to magnetise the stationary and moving cores of a solenoid made in one or more sections. The core rises and elevates the pattern table by means of a rod of non-magnetic material, the speed being controlled by a dashpot. The length of stroke may be varied by a handwheel which adjusts the starting position of the moving core. A resistance takes the inductive discharge on breaking the circuit. When filling and removing the mould, the squeeze head is swung clear; during the actual squeeze the head is supported by an outer strain rod. No jolting is at present provided for, but



Plain squeeze strip-type moulding machine

experimental machines have already achieved 108 jolts per minute. For special soft moulds, e.g., for the casting of aluminium, the pressure on the mould can be regulated by a variable resistance.

Special Control Panel

A special design of switch patented by the Igranic Electric Co., Ltd., is supplied with this machine. On the left of the diagram of the control panel is shown a contactor, which makes and breaks the main circuit from the machine, and is directly controlled by a knee-operated push button; the contactor remains closed while the push button is pressed.

On the right of the panel is another contactor, which is for the purpose of placing the machine across a discharge circuit, for quickly destroying the magnetic field, and dissipating the stored energy in the plunger of the solenoid; the mould falls, without jolting the sand, by gravity against the dash-pot action. The discharge contactor is directly controlled by release of the

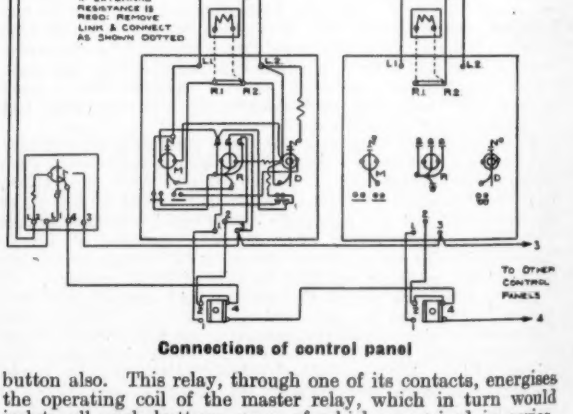
Downsand frame-stripping plate model

push button; interlocks with the main contactor prevent operation of either of them other than in the correct sequence.

Prevention of Electrical Overloads

In the centre of the panel is mounted a relay, which disconnects any other machines from the mains in the following manner:—With three machines there would be three control panels, one master relay, and the necessary push buttons.

Pressing the push button of No. 1 machine, the main contactor and the relay on No. 1 panel would close; the latter acting as a maintaining circuit would isolate its own push



Connections of control panel

button also. This relay, through one of its contacts, energises the operating coil of the master relay, which in turn would isolate all push buttons, some of which are wired in series.

When one machine is operating, no others in the battery can be used until its push button is released.

The two terminals at the top of the panel are short circuited by a copper strip, in place of which a special regulator can be inserted, which permits of variation in the pressure applied by the machine according to the metal worked by the moulds.

Electro-magnetic machines are adaptable for use either on plain squeeze, squeeze strip, downsand squeeze, or downsand squeeze stripping plate work. Four machines operating on the downsand squeeze stripping plate method have just been supplied, and are incorporated in a continuous plant.

Three different types will be demonstrated at the 1932 British Industries Fair, one of which will be a rollover squeeze strip. The machines are built by British Insulated Cables, Ltd., and distribution throughout the British Isles is controlled by Pneulec, Ltd.

Correspondence

Correspondents should forward their communications as early as possible. No letter can be published unless we have the writer's name and address in our possession

Opportunity

I often wonder why charge engineers in stations with capacities varying from 20,000 to 40,000 kW are not given a chance; why our applications for the larger stations are not even invited. In fact we, whose experience is with turbines between 5,000 and 10,000 kW, and boilers of 60,000 lb. of steam per hour, are known now as "rabbits" to our larger brothers.

I wonder how many chief engineers have paused for a moment to consider the *total* responsibilities carried by the charge engineer of a 30,000-kW station, and the corresponding responsibilities of the same position in a 150,000-kW station. I have been an interested visitor to many large stations, and been amazed at how few of my questions have been answered. So many things are left to so many people that to obtain satisfaction I should have had to call a round table conference, with the following representatives present:—charge engineer, boiler house engineer, control engineer, boiler-house and engine-room foreman, and others from the pump house, coal and ash gang, and fitting shop.

I ask you, my smaller brothers—to us the above is just a dream; we have to know everything, every valve, switch, fuse, and duplicate feed, in the engine room, boiler house, and switchboard, turbines, boilers, &c., and nothing is done, or touched, other than routine work, without orders from the only one man, and not *via* a telephone, but on the job.

There is no mistaking us for the chief engineer; we are dirty on account of superintending the generation of 200,000 lb. of steam per hour, whilst seeing also that this steam is put to work with the maximum of efficiency in the engine room and switchboard. We have nobody to deliberate with on any vital points; we must act quickly; and our orders are final.

What a responsibility against that of our "big brother"! We need no blue prints to show us the "boiler check"; and if the stokers fell sick, the station volts would be well within the B.O.T. limits. The smaller stations may have just as many turbines and boilers as the larger ones, whilst their efficiencies are well up to standard bearing in mind that their station load factor cannot be adjusted.

It is not my intention to belittle our larger brothers, or to suggest that there are too many of them, but to show that we rabbits only require an opportunity. The office lift would certainly take a lot of getting into, and, in the meantime, we would be a thorn in the side of the station chasing efficiency, for, after all, no department would be strange to us.

D. P.

January 24th, 1932. *Charge Engineer.*

These Discounts

We have read with interest the closely reasoned article by "Vanadis" in the current issue of the ELECTRICAL REVIEW.

We, as manufacturers, are interested only in fractional h.p. motors. Our past experience definitely entitles us to suggest that the evils associated with the selling of small motors has not been voiced too soon. Moreover, unless some definite steps are taken for restoring order out of chaos, there is a possibility of a state of affairs arising even worse than that which exists at present.

Hitherto, it has been the practice of small motor makers, because their products are mainly of interest to manufacturers of units necessitating the installation of a power motor for operation, to maintain list prices which are subject to a lower discount than those associated with the list prices of general consumable lines, such as switches, incandescent lamps, batteries, &c., and, as stated by the author, the maximum invariably becomes the minimum discount.

Obviously, it is impossible to attempt to gull purchasers as to the value of any product, and motor manufacturers would be compelled to raise prices if there was an insistent demand for increased discounts. Further, discounts alone will not build up goodwill. As the author suggests, the trade is suffering from the lack of any comprehensive acceptable scheme such as is ruling in most industries.

We would welcome any expressions of opinion which would help to inaugurate a scheme which would be acceptable both to manufacturers and selling agents. Moreover, those responsible for the inception of such a scheme could rely upon our hearty co-operation.

KLAXON, LTD.

London, W.1, *January 23rd*. C. R. Gentry, *Director*.

Domestic Refrigeration

Domestic refrigeration will not be popular in this country until manufacturers and supply authorities have given attention to the following points:—

(*a*) Its initial cost, in relation to its useful service in this climate, compared with the initial cost of an electric cooker and the service that the latter gives in the average household, is prohibitive.

(*b*) Most models are bulky and require far too much of the not very ample dimensions of the modern house or flat to accommodate them. There is, moreover, no co-operation between supply authorities and builders of small and medium-size property to make provision for such an appliance, unless it is specially asked for, and to do so afterwards is, in many cases, to add considerably to the cost of installation.

(*c*) Domestic refrigerators are almost wholly to be seen only in the showrooms of supply authorities, who, in my opinion, show considerable apathy in pushing sales. This may be due to the fact that the factors of initial cost and power consumption are so disadvantageous when compared with the cooker that they do not feel encouraged to do so.

(*d*) The near proximity and efficient service one may obtain from provision salesmen and tradesmen, together with the advance of the use of the telephone, makes the usefulness of refrigeration in this compact little country highly speculative.

The whole problem is one of first cost *versus* usefulness, and, unlike most other forms of domestic apparatus, refrigerators do not (at least at the present time) appeal to the general public, and it will require a considerable amount of donkey work in advertisement and demonstration to change that attitude. A relaxation of that lordly attitude of some supply authority showrooms in exhibiting an expensive model in their windows and leaving it to sell itself instead of canvassing their districts, would do something to bring this about.

R. W. STUBBINGTON.

Chingford, *January 19th*, 1932.

A Lot of Little Things

On my return to England last summer, after several years in the Dominions, I stayed with a relative, who was dissatisfied with her electric stove. I found that one half of a boiling plate element was out of action and arranged with the electrical contractor concerned to send one of his staff at an agreed hour with a new plate to replace it. When no repairer arrived that day *or the next*, I called to complain. Regret was expressed to me that an urgent job had prevented their men from keeping the appointment, but no message was sent to that effect, although there was a telephone in the house in question. Three days elapsed after that before the matter received attention.

A little later I leased a new house with no stove in the kitchen. I was informed that provision had been made for the use of either gas or an electric stove but, at a glance, it was evident that the point for the "electric stove" had a maximum capacity of 3 kW. After reference to the architect and his rather loose specification, the contractor was compelled to run a complete new circuit from the distribution board, for the electric range which I selected, *free of cost*.

My point is that the contractor not only had to bring men, tools, &c., on to the job again and spoil the appearance of a new kitchen with surface work, but also he would probably have lost the opportunity to sell an electric stove to another tenant; it would have been much easier to fix a gas stove. Those two instances relate to two leading electrical contractors in this city. The supply authority does not appear to have been interested!

While the stove was being installed last September, I purchased a few appliances, lamps, &c., and, from the advice notes, I knew the cost would be several pounds. But the amount of the statement received was 11s. 9d.! When I called a few days later, I was informed that the account was quite correct, but while I was facetiously preparing to pay it, a clerk hurried from the office to explain that an omission had been discovered.

I asked for an amended account then—in November; I drew attention to the fact that I had not received it in December; and, to-day, I have informed them that, although I am still waiting for it, if they have no use for the money I do not mind.

Three months ago I bought a vacuum cleaner from the local supply authority but since then no representative has called to demonstrate, to inquire whether I am satisfied, to suggest other uses, or to secure the names of any friends who might like a similar machine.

Two houses have been built for a friend of mine in a good locality, as a speculation, but from the time he bought the land, no one in the electrical business has even suggested the installation of an electric stove or water heater; gas will now be used for both cooking and water heating.

In October last, I bought a radio receiver of one of the best known English makes, and a few days later a valve failed. I naturally expected that a new valve would be handed to me in exchange for it, but no! the defective valve had to be returned to the makers' works and a new one supplied by them. After waiting for three or four days, I found, on calling for information, that the shop assistant had thoughtlessly placed the defective valve on the stock shelves, neglecting to return it to the makers. So I had about a week to wait.

A week ago the bushing of a condenser in the same receiver failed: just a stock part but, although I am assured that the bushing was dispatched to the makers immediately, I am still waiting for a replacement. My caustic remarks on the subject induced the agent to suggest that I should write the manufacturers myself. I did, two days ago, quoting advice note number, date, and instrument number. This morning, I received a most courteous reply from the manufacturer's "Service" Manager, disclaiming responsibility as, "*after a careful search*, no trace of any communication from the agent, or the

broken part itself could be found "—incidentally he informed me that the "instrument number" does not convey sufficient information, the "model" should have been stated!

This morning, filled with righteous indignation, I called upon the agent to confront him with evidence of his negligence. He said nothing but merely passed me a letter from the manufacturers, acknowledging receipt of his advice note and the broken part but omitting any promise as to when the replacement would be despatched. I told the agent yesterday that they have not yet begun to grasp the idea of what "service" means in this country. It is no wonder that the fear of breakdown, and consequent inconvenience, still militates against a more widespread use of electrical appliances.

My experience indicates that the electrical trade is by no means singular in that respect. Similar inefficiency is to be found in the establishments of many leading house-furnishers, drapers, grocers, and other traders. Even the baker "forgets" to bring a brown loaf every few days and frequently has to borrow a pencil to receipt his account.

While I am a firm believer in protection, I also hold that the height of a tariff wall to shield such slackness in method will be enough to ruin industry just as effectually as free trade: more thorough attention to detail and greater keenness are urgently needed.

Frequent reference has been made in your columns recently to the desirability of a canvass of the country but, if the conditions in this city are typical of those prevailing in other parts of England, I venture to think that a wholesale canvass of the country would do more harm than good, if it were made before some supply authorities and the trade generally were organised for better *service*.

January 23rd, 1932. SYSTEM.

X-ray Crystal Analysis

The review by Mr. G. Cadogan Rothery of a report on X-ray crystal analysis on page 48 of the ELECTRICAL REVIEW for January 8th, 1932, calls for brief comment.

In the concluding paragraph the reviewer states that "an electrician manipulating the X-ray apparatus would often be in a better position to appreciate questions at issue, quickly interpret results obtained . . ."

May I point out that the technique and interpretation of results in X-ray crystal analysis belong to an extremely difficult branch of modern physics? The "electrician" your reviewer has in mind must have a versatility only exceeded by his modesty in claiming such a humble designation.

V. E. PULLIN.

Research Department, Woolwich, *January 20th*, 1932. *Director of Radiological Branch.*

Still the Boiling Plate

I would like to comment on the remarks in your issue of January 22nd. The suggestion made by a correspondent for combining the boiling plate and immersion heater is not new. It was mentioned by me in an earlier letter under the heading of "External Contacts," these being specially designed contacts on the utensil, engaging with external ones to eliminate trailing leads. The utensil did not rest upon the contacts, but upon the plate, and the scheme had its advantages as well as its drawbacks. I found that trailing leads caused accidents due to the operator lifting off the utensil in a hurry and forgetting it was still attached by the lead. The leads were also continually in the way and got damaged. It is quite conceivable, however, that the arrangement might be useful in certain circumstances, or *pro tem.*, but I abandoned the idea, as, if special utensils are required, better arrangements can be made.

There seems to be a little misunderstanding upon whether matters should be viewed from the operator's or the engineer's standpoint, and whether efficiency is really of such moment. I have cooked simple meals by various methods since 1909, and so stand a fair chance of being able to view matters from the operator's angle, and I find the fact that I am an engineer no drawback. My chief concerns as an operator are: running costs, regulation, and speed, all of which are bound up with efficiency, and so I should say that efficiency really does matter, and that, of course, is the concern of the engineer.

The fact that speeding things up removes grumbles is of little account to me, as I have to pay, and I consider it a short-sighted policy. I don't believe there is any chance of stampeding people into believing electric cooking is unsatisfactory, or not abreast of gas; in my opinion the position in a nutshell is that collectively it isn't as far ahead of gas as it could be. Overrating a thing or underrating its disadvantages never does pay in the long run, as history has repeatedly shown, and the policy of burying one's head in the sand is not likely to be any more successful with electric cookers than with anything else.

The question is also asked why all plates provided are not of the high-speed type, and the answer is that this does not seem to be necessary, and I myself find that cooking is not done that way. One has a favourite high-speed ring or plate upon which things are quickly brought to the boil, and then they are transferred to another one and given the necessary regulation.

Truly, it is very necessary to view some things through the operator's eyes, but this can only be done by occasionally forsaking the slide rule for the apron.

CHARLES E. BAXTER.

Huddersfield, *January 23rd*, 1932.

Non-compliance with Tendering Rules

The Islington Metropolitan Borough Council recently invited tenders by advertisement for the annual supply of stores, &c., for the purposes of its electricity undertaking. Notwithstanding the clear instructions set out both in the advertisement and rules for tendering no fewer than eleven tenders were received which did not comply with them, and consequently were not opened.

My object in writing is to bring to the notice of those who tender that unless the Council's conditions are observed strictly their tenders remain unopened. It is unfortunate that through the careless handling of correspondence and failure to follow instructions clearly set out many firms have possibly lost business. On the other hand it will be accepted by the trade as reasonable that conditions of tendering should be complied with to the letter.

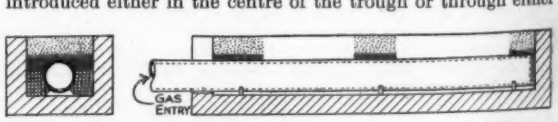
As the advertisement appeared in your publication I shall be much obliged if you will insert this letter in your next issue.

Islington, N., *January 23rd*, 1932. R. H. JERMAN. *Town Clerk.*

Furnace With Non-oxidising Atmosphere

DETAILS of a development in industrial electric heating have come to hand from Wild-Barfield Electric Furnaces, Ltd., North Road, Holloway, N.7. In the chamber of a furnace used for annealing bright steel rods is introduced a non-oxidising atmosphere, the method being the subject matter of a patent taken out by G. W. B. Electric Furnaces, Ltd., and Mr. Van Marle. The chamber measures 8 ft. long by 3 ft. wide by 1 ft. 6 in. to the spring, and has a loading of 100 kW. The heating elements are made from nickel-chromium rod and operate up to a temperature of 1,050 deg. C. Curtains of gas are arranged at any point of the furnace where there is any chance of an air inflow, and this is achieved by a special type of gas distributor, town gas being used in this case. There are two distributors, one in front of the door and one at the back end of the chamber. They are in the form of a perforated or slotted tube lying along a trough made either of heat-resisting metal or firebrick. The tube is embedded in broken firebrick or other refractory material in graded layers. The bottom layer is composed of grains of about $\frac{3}{8}$ in., the middle layer $\frac{1}{16}$–$\frac{1}{4}$ in., and the top layer of more or less powdered material. By means of this packing it is found that a more uniform distribution of the neutralising gas is obtained over the *full* width of the furnace than by any other method. The gas supply can be introduced either in the centre of the trough or through either or both ends. An injector is fitted in the supply pipe or pipes to arrange for the admission of any secondary air required for the combustion of the gas. Outlets are provided at a suitable position in the sides of the furnace for burning off the gas thus admitted to the chamber, and in this way a lazy flame is obtained throughout the chamber, ensuring that the material being heat-treated is in complete contact with the non-oxidising medium. An important feature is that the elements are easily replaceable whilst the furnace is at working temperature. The furnace in question is installed in the works of Messrs. Alfred Herbert, Ltd., Coventry, with the result, we believe, that the outstanding advantages of electric over gas heating—temperature uniformity, ease of control, &c.—have won the field for future development.

G.W.B. non-oxidising furnace



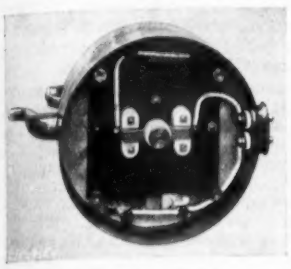
Arrangement of gas distributor

New Apparatus and Devices

for Domestic, Cooking and Heating, Lighting, Power and Scientific Purposes

A Safety Kettle

A "De Luxe" safety kettle has been produced by CARRON COMPANY, Carron, Falkirk, to fulfil the following four essential requirements: rapid and economical operation; thorough reliability; pleasing appearance; and ease of use. By reason of its large base diameter, it will boil two pints in ten minutes for a consumption of ¼ kWh. The robust safety device operates by melting a piece of soft metal and thereby releasing a spring and breaking the circuit. A spare fuse is provided, screwed to the base of the kettle.



Carron safety kettle

The equipment is made of heavy-gauge copper, highly polished or nickel plated, with heavy brass handle supports and ebony-black "Bakelite" handle and feet. It is designed on broad symmetrical lines. The handle covers the whole diameter of the kettle and is unaffected by steam. An easy fitting large-diameter lid facilitates filling and internal cleaning, and the rounded edge of the orifice will not cut or scratch. The kettle is made in two sizes—2-pint (750 W) and 3-pint (1,000 W).

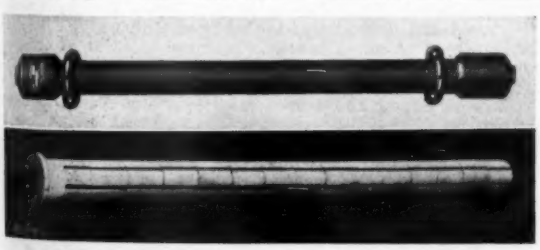
Air-cooled Petrol Engine

A feature of the power unit recently introduced by PETTERS, LTD., Westland Works, Yeovil, is its efficient air cooling. The absence of water jackets and hoppers prevents injury to the engine through failure to refill the hopper when required, or from frost in winter. The engine is supplied in two sizes, a two-cylinder model of 4 h.p., the "Twin-Four," and a single-cylinder set of 2 h.p., the "Solo-Two." Driving from the half-speed shaft (750 r.p.m.) takes all the belt pull and side strain off the engine crankshaft. The engine works satisfactorily and economically on ordinary commercial petrol. Ignition is by magneto, and a centrifugal governor ensures steady running. Forced lubrication is another feature.

The "Twin-Four" petrol engine

"Straight-through" Tube Heater

ELECTROWAY HEATERS, LTD., Baxter Gate, Loughborough, have produced a new tubular heater with a straight-through connection and terminals at both ends, so that connection can be made from the end distant from the feed to a second heater, and so on, without disturbing the element in any way. One end of the steel tube is closed by a pressed-steel cap welded to it, and the terminals at the other end are enclosed in a neat pressed-steel case, also welded to the tube. The terminal cover is another steel pressing retained in position by a bayonet socket fitting. When this cover is removed the terminals project and are thus readily accessible and visible. They are provided with "Ross-Courtney" connecting washers. An accessible earthing terminal is provided within the terminal cap and is riveted to the case.



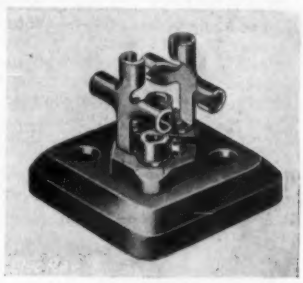
Electroway "double-ended" tubular heater and its element unit

The rods forming the terminals extend the whole length of the heater and serve also to locate the refractory supports for the spiral heating elements. If desired, therefore, terminal chambers can be provided at both ends to enable the supply cable to be led in and connected at either end or to permit contiguous heaters to be supplied through a single cable. One supply cable can be used to feed two or more tubular heaters arranged end to end or at right angles to each other, conducing materially to economy in wiring when tubular heaters are fitted along two or more sides of a room, or around a bay window or recess.

The element consists of a special high-grade nickel-chromium alloy. The heavy refractory supports for the heating coils are carried on stout steel rods in a manner which precludes all possibility of accidental contact between them and the tube. Air spaces within the tube are reduced to a minimum and rapid heating is secured. The heaters are attractively finished in either dark oak, bronze or black, and they retain their finish. They can also be chromium plated.

A Three-outlet Socket

A socket which enables the electrical contractor to provide three outlets for apparatus at very little increase over the cost of an ordinary single-outlet socket has been introduced by Messrs. J. A. CRABTREE & CO., LTD., Lincoln Works, Walsall. It is a 5-A, two-pin, "B.E.S.A." gauge socket, and has an entirely shockproof exterior of very small dimensions. The base enables the wireman to dispense with the customary wood mounting block, and is of brown glazed china deeply recessed at the back for the accommodation of slack cable. It measures 2¼ in. square. Convenient "knock-outs" are furnished on all four sides, so that the sockets may be used on surface wiring systems employing tough-rubber-sheathed or lead-covered cable. Shields are also provided to give the maximum protection to the cable at the point of base entry.



Base of three-plug socket

An interesting feature of the interior is the ingenious three-in-one design of the socket tubes, which is accomplished with a very small number of parts, presumably to eliminate overheating troubles. The "square" socket cover is a brown "Jacelite" moulding and is secured by a single recessed screw. As the device is suitable for competitive installation work the manufacturers feel that it should stimulate the sale of portable electrical appliances by providing multiway outlets where only a single outlet is generally employed.

An Electrically Heated Forcing Frame

Messrs. CHURCH & COLLIS, LTD., Queen Street, Chelmsford, have produced a forcing frame which is transportable, is adjustable in height, and capable of being ventilated while maintaining a wide range of temperature (from 50 to 90 deg. F.) automatically by thermostatic control. The plants are stood on trays of sand or fibre, which can, if desired, be kept damp, and the humidity of the atmosphere can also be controlled.

The "Church" frame consists of a flat base on which is mounted a lower section containing low-temperature electric heating elements, which are thoroughly waterproof in construction. The thermostat is attached to the lower section, the part containing the automatic switch and the adjustment device for temperature being mounted inside a weatherproof cast-iron case, which is shown in the illustration. Over the lower section is placed another with a sloping top, and on this the usual form of glazed cover, resulting in a relatively shallow forcing frame suitable for seedlings and very small plants. When the frame is required for larger plants an extension is mounted over the lower section.

The "Church" forcing frame

The frame is designed for germinating seeds, striking cuttings, and forcing plants. A frame having an area of approximately 6 sq. ft., capable of containing 24 5-in. pots or 48 3-in. pots, in an actual test consumed from two to three kWh per day in the open in December, maintaining an internal temperature of 60 deg. F. The makers claim that the frame has produced remarkable results in the forcing of bulbs, &c.

Notes from Canada

From OUR CANADIAN CORRESPONDENT

THE problem of the development of the international section of the St. Lawrence river continues to be a matter of interest and, apparently, some official activity. The Joint Board of Engineers representing Canada and the United States met in Buffalo before Christmas and is to meet again early this year, when, perhaps, another step leading towards an actual start may be made.

In recent months some newspaper reports have been very optimistic regarding prospects for the commencement of the work at an early date, but on account of its magnitude and cost, as well as the difficulty of affecting agreement amongst the varied interests chiefly concerned, really quick action can hardly be expected.

The scheme is practically certain to be carried out eventually, but one is tempted to quote an advertisement—" Eventually—so why not now?"

Dr. H. E. M. Kensit, who until recently was on the staff of the Dominion Water Power and Hydrometric Bureau at Ottawa, contributed an article to a recent issue of the *Canadian Engineer* in which he showed on a perfectly reasonable and conservative basis, that Canada's (which in this case is Ontario's) share of the power from the international section of the St. Lawrence, totalling about 1,100,000 h.p., would only last some ten or twelve years at the present rate of increase in annual power demand.

Tremendous Growth

The rate of increase is about ten per cent. per annum, thus the load doubles itself in about seven years; the actual increase now amounts to about 100,000 h.p. per annum.

Loads dropped off appreciably during 1931 and the process of recovery may be slow, but there is little doubt of renewed, and even increased, activity in this country in the next four or five years.

The actual installed hydraulic h.p. in the Dominion increased by nearly 125 per cent. between the years 1921 and 1930 and power development is still proceeding on a large scale. Within the next twenty years Ontario will have utilised all the hydro-electric power which under present conditions it is feasible to transmit to existing power-using centres; after that, either economical transmission distances must have greatly increased or else fuel-electric power will have to be employed in those centres.

A Saskatchewan Project

These Notes, a little while ago, recorded the progress being made by the Saskatchewan Power Commission in that province. Saskatchewan is better supplied with coal resources than with water power, but a recent survey of the Saskatchewan River indicates that at an initial cost of about $15,000,000, with another $3,000,000 later on, sufficient hydro-electric power could be developed to serve the needs of Regina, Saskatoon, Moose Jaw and Prince Albert for several years. After that steam power would probably be required to take care of peak loads.

Winnipeg, fortunate in having very cheap hydro-electric power, reached the enviable position of having an *average* domestic consumption of 4,008 kWh per consumer in 1930—a domestic annual load factor of over 45 per cent. is an achievement to be proud of. It shows what low rates can do, combined, no doubt, with an aggressive policy.

In 1920 the corresponding figure was 928 kWh, and this has been increased since by approximately 300 kWh every year.

Illumination Glassware

The writer was informed recently, by one who should know, that, judging from English catalogues, electrical glassware used in England is not suitable in style for use in this country, and that there seems to be very little variety.

Continental glassware, he thought, is inferior to that obtainable in the United States, some of the opalescent material, for example, having spots in it; he admitted having had no experience of English glassware although he hoped that, under the new tariff arrangements, British makers might find it possible to export to this country.

British manufacturers should study the Canadian market, as there is a good deal of electrical glassware used here, but it will never do merely to send out some of the English types of shades and globes, &c.

An Ambitious Scheme

The Premier of Manitoba, a few weeks ago, made public reference to a scheme which has been proposed to utilise some of the rivers in North-Western Canada to irrigate some of the western districts subject to drought, such as those which have suffered so much during the past twelve months. Thousands of families on the farms in certain parts of Southern Saskatchewan have been absolutely destitute, and hundreds of square miles of what is normally fertile land are said to look like a desert, due to lack of rain.

The scheme referred to, which appears to be a very ambitious one, would create in the so-called Barren Lands a stupendous lake " double the size of the Great Lakes," and make possible within 150 miles of Winnipeg the development of about 400,000 h.p. Three of the great rivers now flowing into the Arctic Ocean and Hudson Bay would be utilised—the Mackenzie, the Coppermine, and the Saskatchewan.

The degree of confidence which can be placed in modern long-distance transmission is well illustrated by the performance of the 230-mile 220,000-V line which transmits power from the Gatineau River in Quebec to Toronto in Ontario. This line has recently completed 23 months of operation without a single interruption due to 220,000-V line faults. This excellent record is manifestly the result of good design and construction.

A report has recently been submitted to the city council of Vancouver B.C. that 220,000 h.p. could be developed at five plants in the water reserve of the city on the Cheakamus river, at a cost of $23,959,000.

Cleaning Silver by Electricity

HOW many electrical people employ their broadcast accumulators to clean the family plate? Most of us are familiar with the common process of cleaning silver by immersing the solid or plated articles in hot soda-water in the presence of a piece of aluminium. The process has been exploited for years past at domestic exhibitions, the piece of aluminium, usually punched out in some eccentric shape, being sold under some fancy name at about twenty times its intrinsic value.

The explanation is that the aluminium and, say, a silver spoon, when immersed in a 3 to 5 per cent. *hot* solution of ordinary washing soda will give an e.m.f. of some 1.5 V, by virtue of a simple electrolytic process.

This aluminium-soda process, although slow, is certainly efficient. On foggy days silver or silver-plated cups and so forth rapidly assume the well-known yellow-brown hue due to the formation of silver sulphide. When the article is cleaned in the ordinary way this silver sulphide must be *rubbed off*, thereby reducing the weight of the " solid " article, or reducing the thickness of the silver deposit on the " plate." The electrolytic process, however, has no such wearing effects; the silver in the silver sulphide tarnish is reduced back again to the metallic state and exhibits all its original burnish.

It seemed to me quite unnecessary to create a primary battery with a piece of aluminium in the washing-up bowl, when a more convenient source of electricity was to be found in the accumulator for the wireless set. The results then obtained were little short of astonishing.

The most striking effect may be obtained by experimenting with a heavily ornamented silver or silver-plated article such as an old-fashioned christening mug; many of these exhibit heavily raised or indented patterns that are not easily cleaned by the ordinary rubbing process. Hence, more likely than not, they will be found in a well tarnished condition. If, due to domestic efficiency, no suitably tarnished articles can be found in the house, then they may be made so by placing a few drops of ammonium sulphide in a basin of water, immersing the silver articles therein and letting them remain for a few moments.

A china or enamelled bowl should be filled with hot soda water (about 5 per cent. soda). The *negative* lead from the accumulator is then attached to the article to be cleaned, and the object, thus connected, is totally immersed in the hot soda solution. A lead from the *positive* terminal is next immersed in the soda solution within an inch or two of the object under treatment and, hey presto! the silver or plated article becomes brilliantly polished. The article is rinsed in warm water, dried by a cloth and returned to its cabinet in all its original glory. The positive electrode may be the plain copper wire of the lead itself, but undoubtedly a short length of arc-lamp carbon is better.

In order to test the truth of my earlier statement that no loss of silver takes place, a large number of silver articles were cleaned in the smallest possible quantity of hot soda solution. The used solution was then neutralised and acidified with nitric acid, thus forming a perfectly clear liquid. The addition of hydrochloric acid produced no turbidity or precipitate whatever, thereby demonstrating the total absence of any trace of silver in solution.

These experiments in the domestic kitchen naturally prompted the idea that the scheme had commercial possibilities, particularly in hotels and restaurants, and I find that a considerable amount of work in this particular direction has been undertaken by Messrs. Marryat and Place, who, I am assured, would be only too pleased to co-operate with any electrical manufacturer who cared to develop the general idea. Silver tableware is cleaned in large establishments either by hand (plate powder and so on) or by burnishing in a mechanically driven rotary " rumbler " using steel balls as the polishing medium. These arrangements must of necessity be expensive in labour and wearing to the plate, whereas it would appear that an electrolytic bath might be designed that was capable of doing this work in one-tenth of the time and with no wearing effect on the silver whatever.—R. W. KENNEDY.

Domestic Electrification. By J. Alex. Bell, M.I.E.E., M.I.Mech.E.

A means of counteracting the slump in the industrial load

DURING the last year or two many electricity supply undertakings with a substantial power load have been severely hit by the prevailing industrial depression. Many have made up the loss of output by an intensive campaign which has brought a large increase in the sales of electricity to domestic users, and so have been enabled to keep on the right side financially. Possibly their experience may give food for serious thought in those places where, for various reasons, the domestic consumption is still almost purely for lighting, and where heating and cooking are still discouraged by high tariffs and lack of hiring facilities.

Whatever may be occurring in industry, light and warmth are still essential in the homes of the people. Consequently a domestic load of uses other than lighting provides a steady foundation which is very little affected by trade fluctuations.

There are two essential requirements in building up such a domestic load. The first is that facilities must be provided for obtaining the necessary appliances on reasonable terms, and the second is an attractive tariff.

Cost of Apparatus a Deterrent

At first sight, some people may be disposed to question the order in which these two essentials have been placed. The experience in Aberdeen is that the initial cost of providing an installation and apparatus is usually a greater deterrent to the use of electricity than the actual running cost, *so long as the latter is not prohibitive.* When the consumer can overcome the difficulty of the initial outlay by a hire or hire-purchase scheme, he is only too glad to take all the advantages which electricity can offer.

In the first place, then, the supply authority must have a scheme for the simple hire of apparatus. This gives the consumer confidence in making what, to him, may be a big experiment. He knows that if the experiment turns out a failure he can return the apparatus, which he has only paid for while it has actually been in use. When, as generally happens, he finds that his experiment has been a success, he is more disposed to spend the money to make the apparatus his own property.

As a matter of historical interest it may be noted that the Aberdeen Electricity Department started the hiring of heating and cooking appliances as far back as 1909. At the end of the first year there were out on hire 192 irons, 33 radiators, 24 convectors, 7 grills, 5 cookers, and a few miscellaneous articles; at the present time the total figure is close on 14,000.

The most attractive scheme of hiring is of no use unless it is brought to the notice of the public by means of a well-stocked showroom situated in as prominent a position as can be obtained. The original showroom, which was opened in 1909, consisted of a small shop and basement in Union Street, the principal thoroughfare of the city. After the war the business had expanded to such an extent that these premises were totally inadequate. Consequently, in 1927, a block of property, also in Union Street, and even more centrally situated, was acquired and reconstructed by degrees as the various tenancies expired.

The new showroom was brought fully into use just over a year ago, and affords ample accommodation for the display and demonstration of all kinds of domestic apparatus. A much larger variety of stocks can now be carried, and all repair and overhaul work can be done on the premises; previously much of it had to be sent to the workshops at the generating station.

A Good Display Stimulates Sales

One result of the better displays has been the large number of fires bought outright in replacement of hired fires, as selection can be made from an adequate stock to suit individual ideas of harmony in decoration. This also confirms the suggestion that I have already made that the hiring of apparatus gives the consumer confidence in its reliability.

Cookers, water-heaters, wash-boilers and the heavier appliances of this class must continue to be hired, at least until the prices are considerably reduced. Hiring must also be continued until the product is so much improved that any further progress can only be of a minor nature and affecting small details. At the present time obsolescence is the great bugbear of the financial side of any cooker-hiring scheme, but it is the price which the supply side of the industry must pay for progress.

Alongside a hiring scheme for apparatus, an assisted wiring scheme is also necessary to obtain the smaller class of domestic user even for lighting purposes. In Aberdeen such a scheme is based on repayment over a period of three years. When it was instituted in 1926 repayment through a slot meter was given as an alternative. Abuses of this method, coupled with the fact that the majority, even of the smallest consumers, selected the three years' method of payment, caused its abandonment after a comparatively short time.

The Iron as a Missionary

The electric iron is the most potent means of introducing the consumer to the "other uses" of electricity. For many years this department has adopted the policy of leaving an iron on a month's free trial with every new domestic consumer. The meter fixer leaves the iron at the house with a printed leaflet explaining the terms and giving simple instructions for use. At the end of the month a showroom inspector follows up with a hire-agreement form, which is usually signed at once. Comparatively few of the irons are returned, and the cost of the scheme is small in comparison with the revenue from the resulting sales of electricity.

Tariffs for electricity supply will probably never cease to be a subject for discussion. It should be axiomatic, however, that they should be as simple as possible. They should also be of such a nature as to attract business in face of competition. Separate flat rates for lighting and heating are the simplest and most easily understood, and these have been in use in Aberdeen since the domestic load was cultivated.

A Two-part Tariff Essential

To give the consumer the maximum of convenience, an alternative of a combined tariff should be offered. It was decided to use rateable value as the basis of the primary charge, and there has been no reason to regret this decision.

Rateable value is understood by everyone. There is no question as to what the rateable value is; every householder knows that for himself, and can calculate his own fixed charge. He does not need to wait until a representative of the Electricity Department counts the rooms in his house, measures their area, performs some apparently abstruse mathematical calculations, makes allowances for the wattage of his lamps (all of which he may change next day), and then announces what the fixed charge is. The rateable value is fixed by an independent authority, and there can be no suspicion on the consumer's part that his neighbour has been favoured.

The fixed charge was originally made (in 1925) 12½ per cent. of the rateable value with a running charge of ¾d. per unit. Successive reductions in charges have now brought this down to 7½ per cent. and ½d. per unit. During the financial period (of ten months only), ended May, 1931, just over 3½ million units were sold on this tariff at an average price of 0.935d. per unit. The rate during this period was 10 per cent. plus ¾d. per unit, and the number of units per consumer approximately 2,000. In addition to this about 5,656,000 units were sold for heating and cooking at the ordinary flat rate.

In Aberdeen gas is supplied at from 2s. 3d. to 1s. 8d. per 1,000 cu. ft., the cheapest figure in Scotland, and one reached by very few towns in England.

Doubt is sometimes expressed as to the effect on the station peak of a heavy domestic load. Aberdeen's experience is that it improves the general load factor. In residential areas the sub-station peak loads occur between 8 and 8.30 a.m., and again in the evening when the industrial power load is off. Between 4 and 5 p.m., when the generating station peak occurs, the residential sub-stations are carrying only a moderate load. A cold spell will bring up the morning maximum, but much even of the office heating load is off when the afternoon peak occurs. The domestic load is worth cultivating.

The Training of Demonstrators

The committee elected at the conference called by the E.A.W. on October 21st to draw up a scheme for the training of women as demonstrators has issued a preliminary report.

The committee agrees that a candidate should have gained a certificate in domestic subjects from a recognised domestic science college and the following are regarded as suitable:—(1) The Teachers' Certificate (two or three years' course); (2) Certificate in Household Science (two years' course); and (3) Housekeeper's Certificate (one year course). A syllabus of the requisite electrical knowledge is to be sent to the colleges giving courses in domestic training. This preliminary training should be followed by practical and business experience in an electrical showroom.

The E.A.W. proposes to issue a "Grade I Diploma" to those who have reached the necessary standard of experience, first of all to women already in the industry. Those who have had four years' experience and are considered by the committee to merit the award will not be required to pass an examination. An application form for the diploma can be obtained from the E.A.W., 46, Kensington Court, W.8. The first diplomas will be presented by the president of the Association at the annual general meeting in April. At a later date the committee proposes to award two further diplomas—one, mainly theoretical, for schoolgirls, and the other, mainly practical, for domestic workers.

Business and Industrial Notes

The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments, Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations, and Failures

The British Industries Fair

Two useful handbooks are being circulated for the use of visitors to the Birmingham Section of the Fair. The first gives very full particulars of travel arrangements, with special reference to concessions granted by railway and shipping companies, free visas for passports, banking and exchange, and accommodation. Details of boat train services and trains to Castle Bromwich are set out in another section, and the facilities available at the Fair to visitors from overseas are mentioned. The booklet includes admission and free catalogue tickets, as well as a voucher entitling the holder to special concessions offered by the proprietors of houses of entertainment in Birmingham.

The second handbook is a 23-page catalogue of the articles which will be displayed in the Birmingham Section. From this it can be seen that the electrical exhibits will be of a most comprehensive and varied character.

Messrs. Birkbys, Ltd., inform us that they will have a stand at Birmingham (as well as London) although their name was not included in the preliminary list of exhibitors in that Section.

The Hart Manufacturing Co. informs us that owing to pressure of business and the necessity of concentrating on affairs connected with the immediate manufacture of English made "Diamond H" switches, they have found it necessary to withdraw from the Birmingham Section of the Fair.

The Dairy and Ice Cream Exhibition

The electrical trade was well represented at the recent National Dairy and Ice Cream Exhibition held at Olympia.

Among the dairy exhibits several new bottle-washing machines were shown. Messrs. Farrow and Jackson displayed the new "Miller" washer, capable of dealing with 10,000 bottles an hour, which subjects the travelling bottles to hot-water sprays, brushes, and then a second wash and thorough rinsing. The machine is driven by three electric motors, and needs only one attendant. The Thomas Hill Engineering Co., showed two small bottle washers, driven by small motors. The "Clover" washer has inside and outside brushes and a rinser for six bottles; the "York" washer for small establishments has an inside brush and rinser for one bottle. Messrs. Dawson Bros. showed their new "Hydrofilcap," which washes, fills, and caps milk bottles, and Messrs. Graham Enoch displayed their new rotary filler and capper, driven by a ½-h.p. totally enclosed motor. A new small model of their "Alka" capping machine was shown by Messrs. Hiron and Rempler.

Several freezing cabinets were on view, the British Automatic Refrigerators, Ltd., exhibiting a large double storage cabinet with the freezing coil arranged down the middle, so as not to interfere with the storage space. The same company showed a combined freezer and storage cabinet with the motor and compressor enclosed within a machine compartment. The freezer drive is coupled to a rustless gear with a sight feed lubricator. Stainless steel was largely used in the ice cream machines. The General Utility Co., exhibited a horizontal freezer fitted with a seamless, stainless steel freezing cylinder. The beaters and scrapers can be run from a motor fixed to the base of the freezer. Messrs. Guiterman showed a new "Mortimer" two-holed freezing cabinet, using ice and salt. The electric motor driving the freezer has a cut-out device which cuts out the motor when the mixture has frozen hard.

Electricity in the Home

On January 21st, at the Eastbourne Corporation electricity showrooms in Grove Road, Mr. V. W. Dale, of the British Electrical Development Association, gave a lecture on "Electricity as an Aid to Labour-saving in the Home." Mr. Dale traced the development of the power machine from the time when conquest was dependent entirely upon the muscle of man and beast right up to the most modern achievements of steam and electricity. The lecture was illustrated with lantern slides dealing with transport by land and sea, the building of great cities, and also the organisation and operation of various industries. He stated that with electricity at ¼d. per kWh, as was the case in Eastbourne, the heaviest of the work in the home could be done almost without human effort for the cost of a few pence per week.

E. D. A. Activities During 1931

In spite of the difficulties of the times the British Electrical Development Association continues to expand its services.

The main aim of the E.D.A. Electric Homes Campaign was to extend and improve existing domestic installations; 500,000 of the "Three Plug Points" booklets were sold, and 30,000 copies were posted direct to applicants replying to the Association's advertisements in the Press, while 30 demonstration houses were organised in different parts of the country. The final report of the E.D.A.-E.L.M.A. Shop and Display Lighting Campaign showed that the lighting equipment was examined in 16,711 shops; 13 Press luncheons were organised, and 77 lectures were given to Rotary Clubs and meetings of shopkeepers.

Assistance was given in connection with the organisation of the Faraday Centenary Exhibition at which the Association had two stands. Over 100,000 copies of a Faraday booklet were sold, while over 2,000 lecture handbooks were issued to teachers and others. The Association organised the I.M.E.A. Exhibition at Scarborough in June and provided stands at the Royal Agricultural Show, the Bath and West and Southern Counties Show, and the Highland and Agricultural Society of Scotland Centenary Show. An E.D.A. processional van was entered in the Lord Mayor's Show on November 9th. Assistance was rendered by London and provincial officers at a number of other exhibitions, including the British Industries Fair.

Schools organised during the year included a four-day electrification course for women demonstrators in April, and a two-day publicity conference for supply undertaking sales and publicity managers in October. Lighting development conferences for engineers and chairmen took place in London, Bristol and Manchester in October, November and December. Salesmanship conferences were held in London, Birmingham, Liverpool, Manchester, Newcastle-upon-Tyne, Leeds, Bradford, and Wakefield. New committees have been established to deal with electric traction, street lighting and neon signs. Sales of general publicity, window displays, and advertisement blocks, amounted during the year to over £6,000—a gratifying increase over the figures for previous years.

Prince George Visits Carron Company

Included in the Scottish industrial tour of H.R.H. Prince George was a visit, on January 18th, to the Carron works. The Prince, who was met on his arrival by Mr. F. L. Burden, chairman of the company, and the directors and manager, was first shown two historic tablets, one of which was part of the first blast furnace, while the other formed part of the cylinder made at the works in 1766 for James Watt's first steam engine. A visit was then paid to the blast furnaces, where a cast was in progress, and to the moulding shops. Passing through one of the warehouses, the party completed its tour with a visit to the electric cooking and heating department where the various stages in the assembling of electric cookers, fires, irons, kettles, &c., are carried out.

Venners to Extend

Although it is only about seven months since Venner Time Switches, Ltd., moved to their present factory at Kingston By-pass Road, New Malden, the large demand for time switches, prepayment meters, and the company's other products has already made it necessary for the works to be enlarged. When the factory was built it was considered large enough to cover developments for the next two years.

L. G. Hawkins's Change of Policy

As a result of the introduction of duties on electrical apparatus Messrs. L. G. Hawkins & Co., Ltd., intend to pursue a policy of selling goods made entirely in the British Isles. The change will, of necessity, be a gradual one; as a commencement, an all-British shop-window lighting reflector called the "Supreme" has been placed on the market.

Mr. Amery on the Monetary Position

The chief guest at the luncheon of the Batti Wallahs' Society, which was held on January 21st at the Hotel Metropole, was the Rt. Hon. L. C. M. S. Amery, who gave an address on the monetary crisis. He said that although there was evidence of over-production in a few industries, generally there was no reason to believe that over-production was the cause of the present crisis; rather was it a case of under consumption. There was a shortage of means due to the dislocation of the world gold supply, three-quarters of which was stored up in the vaults of America and France and was therefore useless from the point of view of world trade. He suggested that one remedy was an Empire unit capable of holding its own with American trade. There should be an Empire agreement on which the basis of sterling would be maintained.

The restoration of silver to its normal value might also prove of advantage, as sterling silver would improve the Eastern market and automatically bring such countries as China, Persia, &c., into the world market.

German Lamp Concentration

It is announced that the Bergmann Electric Co. has disposed of its electric lamp factory to the Osram and Pintsch companies, which will continue the production on joint account. The purchase price is to be partly in cash and partly in shares.

Swedish Engineering Lock-out Postponed

As a result of a compromise the Swedish Employers' Union has agreed to postpone until February 2nd the threatened lock-out affecting 91,000 men in the engineering industry and ironworks. In the meantime 11,000 men remain on strike. A new scale of wages is to be considered by the Unions concerned.

Domestic Appliances in America

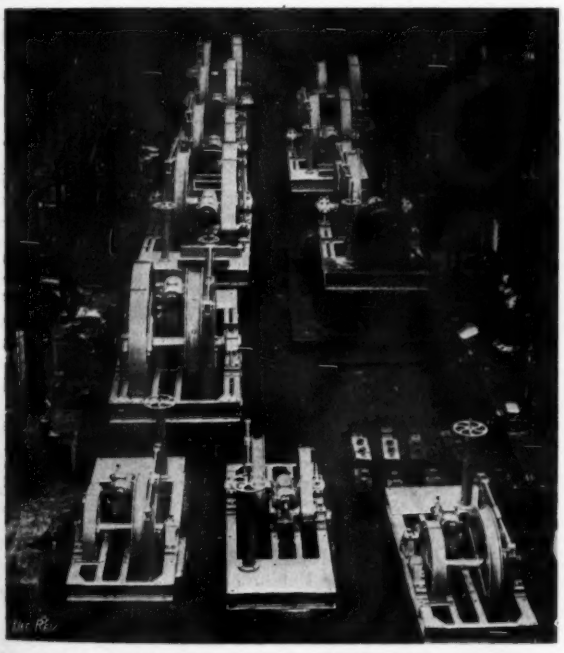
Large decreases in the value of the sales of practically every class of electrical appliance during 1931 are revealed by figures published in a recent issue of *Electrical Merchandising*. An outstanding exception was electric household clocks, sales of which rose in value from $15,155,000 to $17,200,000, while domestic refrigerator sales at $216,000,000 were $18,375,000 above the 1930 figure. Although about 10,000 more washers were sold, the sales value declined from $83,809,000 to $69,020,000. There was a slight increase in the sales of incandescent lamps for private and commercial purposes, but this was more than offset by a decline in the industrial and miniature lamp section, the total value of lamps sold falling from $142,545,000 to $139,000,000. Among the most important decreases were:—Vacuum cleaners, from $52,818,865 to $34,332,400; dish washers, from $3,000,000 to $2,400,000; fans, from $15,474,950 to $10,170,532; heaters and radiators, from $1,151,440 to $460,576; hot-plates, stoves, and grills, from $1,587,900 to $873,345; irons, from $10,867,500 to $7,824,600; percolators, from $6,632,875 to $3,707,725; ranges, from $27,600,000 to $19,335,000; sewing machines, from $28,728,000 to $19,350,000; and toasters, from $6,946,500 to $4,862,550.

Compulsory Registration

Speaking at the recent annual dinner of the Bradford branch of the Electrical Contractors' Association, Alderman Ilingworth (deputy-mayor of Bradford) called for a move towards securing the compulsory registration of contractors. He thought it a serious matter that the village blacksmith was permitted to dabble in electric lighting installations. The President of the E.C.A. (Mr. W. R. Rawlings) said that the Association had been aiming at compulsory registration for over 30 years; he thought that in a little time its object might be achieved. The Association was jealous for its reputation, and any member guilty of carrying out bad work would be asked to resign.

Electric Haulage Gear Production

Messrs. Clarke, Chapman & Co., Ltd., have carried out during recent months a considerable number of export orders for mine winding and haulage gears. An interesting example of such work is given in the recently executed order for twelve electrically driven endless rope haulage gears. These haulages are to operate on gradients of from 7½ in. to 11 in. per yard against loads of from 18 tons to 32 tons. Three of the endless rope haulage gears will be used on a gradient of 10½ in. per yard with a load of 32 tons; the speed will be 2.46 ft. per second over a distance of 1,200 yd. Three more of the haulages



A number of Clarke, Chapman electric haulage gears

will operate over a distance of 1,120 yd. against a load of 27 tons on a gradient of 8 in. to the yard, the speed being 2.46 ft. per second.

We reproduce a view of one of the company's shops showing a number of the gears in course of erection.

Colour Lighting

Holophane, Ltd., Elverton Street, Vincent Square, S.W.1, has produced a well-illustrated 40-page booklet in which colour lighting is dealt with as comprehensively as possible from both the illumination and decorative points of view for stage and auditorium. It is printed in colours, and an endeavour has been made to present the matter in such a way as to indicate what can be achieved to-day in the colour lighting of cinemas and theatres. The index is a useful feature, showing at a glance every detail in the booklet, which covers a wide scope in an unusual manner. The company's demonstration theatre and advice are at the service of anybody who contemplates the installation of colour-lighting schemes.

New "Northmet" Showrooms

Still another showroom has recently been opened by the North Metropolitan Electric Power Supply Co. This one is at Hatfield Road, Potter's Bar, and it brings the number of showrooms now owned by the company to eighteen. The premises are neat in design, and, as will be seen from our illustration, look exceedingly well when floodlighted. In addition to the well-equipped showrooms there is a demonstration

The new "Northmet" showrooms at Potters Bar

kitchen, together with excellent office accommodation for the staff. The company now serves approximately 86,000 consumers, over 14,000 of whom were connected during 1931.

British Insulating Materials

During recent years large quantities of spools, bobbins, and coil formers have been obtained from abroad by British manufacturers of electrical apparatus, largely due to lack of effective competition by home-produced goods, but now conditions have changed and British supplies, competitive in both quality and price, are available. At the Walthamstow works of Micanite & Insulators Co., Ltd., a special department has been organised to manufacture from British raw materials, bobbins, spools, and coil formers of every description for makers of instruments, switchgear, motors, starters, generators, wireless, bells, and other apparatus.

The spools are made of any required material, such as "Paxolin" and "Micanite," and various kinds of composite materials, such as presspahn, leatheroid, vulcanised fibre, &c. The requirements of any working conditions with regard to electrical resistance, shape, detachable flanges, and drilling are met. Both round and square-centred types of spools are made, the end flanges being fixed securely to give a robust construction. This is an important feature, the economy of which will be appreciated by manufacturers who desire to avoid high scrap loss.

Canadian Duty on Electric Lighting Fittings

The *Board of Trade Journal* states that according to Appraisers' Bulletin, No. 3793, issued by the Canadian Department of National Revenue, the value has been fixed for duty on stationary lighting fixtures and portable electric floor, table and novelty lamps and shades imported into Canada at the following advances on the true invoice values:—When $3.25 per unit or less: True invoice value plus 33⅓ per cent. When greater than $3.25 per unit: True invoice value plus $1.10 per unit; the unit to be regarded as the separate fixture, lamp or shade, each unit to be invoiced separately. These values are not to apply to importations *bona fide* purchased on or before January 22nd.

Conditions in Netherlands East Indies

A Department of Overseas Trade report, prepared by Mr. H. A. N. Bluett, H.M. Commercial Agent at Batavia, on the economic conditions in Netherlands East Indies, states that the past three years have seen a decline in general prosperity, due entirely to a continuous fall in the market value of the islands' staple agricultural and mineral products. For the first six months of 1931 the value of imports decreased from fl. 459,832,000 to fl. 289,926,000 (fl. 12.10=£1 at par). Machinery, tools, and technical appliance imports amounted to fl. 21,381,000 (fl. 45,122,000). In 1928 Great Britain was second only to Holland as supplier of foreign goods, but by 1930 had fallen to fourth place, having been passed by both United States and Japan. Most merchandise imported from Europe passes through the hands of general merchants, whose head offices are in Holland, and the country of manufacture is immaterial to them so long as the goods are cheap and suitable for the requirements of a tropical market. The most advantageous form of representation for a British manufacturer is to concede his sole selling rights to a general importer. In all business the price of the article offered for sale is the first consideration.

New Australian Company

Among new companies registered recently in Sydney, is Empire Austral Products, Ltd. (capital £2,000), manufacturers and dealers in electrical goods, &c.

Eureka Vacuum Cleaners

The Eureka Vacuum Cleaner Co., Ltd., of 8, Fisher Street, Southampton Row, W.C.1, states that it does not intend to establish a factory in this country, but it has completed arrangements whereby its entire business will be taken over by a large English company which will manufacture Eureka cleaners here. All connection with the American company will be severed.

Social Events

The Magnet Social & Athletic Club of the General Electric Co., Ltd., recently entertained a large party of the junior staff at Magnet House, and under the leadership of Mr. E. A. Joyce, the young people enjoyed themselves with games and dancing. The absence of Mr. L. C. and Mrs. Gamage was much regretted, and the prizes which they awarded to the best dancers were presented by Mr. H. W. Roberts (sales manager). Mr. T. Gill gave a conjuring and ventriloquial entertainment.

On January 15th, about 250 members of the staff of Johnson and Phillips, Ltd., with their friends, attended the annual J. & P. staff dance and carnival at Woolwich Town Hall. Mr. Leslie Wates, the chairman of the company, and Mr. and Mrs. C. Stewart, were early arrivals, and a very special welcome was given to Mrs. Stewart, who, after her recent illness, had made the J. & P. function her first public appearance. Representatives attended from many of the home branches.

A social evening, with a whist drive and dance, was held on January 23rd, under the auspices of the Manchester Section of the Electrical Power Engineers' Association, at the Grand Hotel, Manchester. About 190 members and friends attended and Mr. S. A. Russell, chairman of the Section, presented prizes awarded in connection with the whist drive and a spot waltz.

The staff and employés of the Torquay electricity undertaking held their annual dinner at the Commercial Hotel, Newton Abbot, on January 22nd, over 100 being present. The chair was taken by Mr. G. J. Hollyer (borough electrical engineer) supported by Councillor J. Taylor (vice-chairman of the Electricity Committee). Entertainment was provided by Mr. R. C. King (a member of the testing staff), and by Mr. R. W. Brinton and his party.

Recent Contracts

Siemens Electric Lamps & Supplies, Ltd., have received an order from the Dublin United Tramways Co. for a year's supply of omnibus lamps.

Messrs. F. W. Woolworth & Co., Ltd., have placed an order with Fredk. Thomas & Co., Ltd., for "Efteelite" illuminating glassware for lighting their new premises in Oxford Street.

Recent contracts secured by Messrs. Gillett & Johnston, Ltd., include electric clocks for the following buildings:—Messrs. Beale's new premises, Bournemouth; Hoover's new factory, Perivale; the Wellcome Foundation, Euston Road; Worthing Municipal Buildings; Hay's Wharf, London Bridge; and the Masonic School for Boys, Rickmansworth.

A Lamp Suggestion

A correspondent signing himself "An Interested Party" thinks that the imposition of duties on electric lamps may make it unprofitable to import them. He suggests, therefore, that importers might, in partnership, commence the manufacture of lamps themselves. Such a course would be commercially sound even if there were no protective duties.

Business Research and Management Association

We are informed that all communications to this Association should in future be addressed to Mr. H. A. Haylett, hon. secretary, c/o the Basil Butler Co., Ltd., Quality Court, Chancery Lane, W.C.

For Sale

Several trade stocks of wireless and electrical goods will be sold by auction by Mr. Henry J. Shaw at 13, High Holborn, W.C.1, on February 3rd and 4th.

The South Somerset and District Electricity Co., Ltd., has for disposal certain plant now installed at Chard Junction.

(See our advertisement pages to-day.)

Transport Workers' Wages

The "Underground" Group of companies announces that proposals for an all-round temporary reduction of wages and salaries have now been formulated and presented to the trade unions concerned. The official announcement states that the proposal is that all earnings shall be subject to a deduction of 2½ per cent.; a further deduction of 2½ per cent. shall be made in respect of all earnings in excess of 40s. a week; and a still further deduction of 2½ per cent. shall be made in respect of earnings in excess of £750 per annum; provided that no deduction shall be made to reduce the earnings of any adult member of the staff below 40s. in any one week. All contributions to superannuation, endowment, or other funds are to remain in effect as if no deduction were made from earnings. The companies do not propose to make any deduction in respect of any pension or grant which the board may make while these deductions from earnings are in force.

At a meeting of the "Underground" workers who are members of the National Union of Railwaymen, held on January 25th, it was decided to request the executive committee to get into touch with other organisations with a view to joint action being taken to resist the proposed reductions.

A provisional agreement for the settlement of tramway workers' wages throughout the country was arrived at in London on January 26th by the National Council for the Tramways Industry. Under the agreement the wages of adult employés on a weekly rate above 47s. 6d. and up to and including 54s. are to be reduced by ½d. per hour. The pay of employés on a weekly rate exceeding 54s. will be reduced by ½d. per hour, while youths' wages will be reduced by 1s. per week. There will be no reduction in respect of adult employés on a weekly rate of 47s. 6d. and under. Wages of tramwaymen in the Metropolitan area are to be the subject of separate negotiations.

The New Worthing Showrooms

Worthing's new electrical showrooms, the running and stocking of which by the Corporation for the purpose of selling direct to the public has lately been the subject of considerable controversy, were officially opened by the Mayor on January 25th. The site is immediately adjacent to the new head Post Office and almost opposite the new municipal buildings in Chapel Road. The front is illuminated and altogether there are 135 lighting points for use if desired in connection with the lighting of the front and showroom windows while the fittings in the showrooms are for the most part in the cubist style. The rooms are heated with a combined system of "Morganite" panels fixed above the picture rail and "Unity" tubes at skirting level, both thermostatically controlled. The latter work has been carried out by Messrs. Barker, Young & Co., while the wiring of the premises was done by Messrs. Phillips & Dart.

In declaring the new showrooms open the Mayor mentioned that the undertaking was started in September, 1901, and for the first complete year the income was £3,538 and the electrical energy sold 228,166 kWh. At the end of last year the income had risen to £81,081 and energy sold to 7,383,571 kWh with 10,007 consumers. Councillor J. A. Mason, the chairman of the Electricity Committee, in proposing a vote of thanks to the Mayor, paid a tribute to the work of the borough electrical engineer (Mr. G. Porter) and the consumers' engineer (Mr. H. H. Wiggans), who will now have the management of the new showrooms.

Radio Manufacturers' Association

At the annual meeting of the Radio Manufacturers' Association, held on January 21st, the following fifteen companies were elected to the Council:—Brownie Wireless Co.; Climax Radio & Electric; E. K. Cole, Ltd.; Edison Swan Electric Co.; Ferranti, Ltd.; General Electric Co., Ltd.; Igranic Electric Co., Ltd.; Kolster-Brandes, Ltd.; Marconiphone Co., Ltd.; L. McMichael, Ltd.; Mullard Wireless Service Co., Ltd.; Pye Radio, Ltd.; Radio Instruments, Ltd.; Standard Telephones & Cables, Ltd.; Ultra Electric, Ltd. These members are empowered to appoint additional members up to a maximum of 21.

Foreign Manufacturers and the British Market

The London Chamber of Commerce continues to receive inquiries from foreign manufacturers for the names of British firms who are in a position to manufacture goods in England from their designs under licence or on a royalty or contract basis. Among the goods specifically mentioned in a letter received from the Chamber are enamelled and covered wires, insulating materials and manufactures, flashlamp bulbs, carbon rods, dry battery parts, etc. Actual or potential manufacturers of these materials can obtain further information from the Publicity Department of the London Chamber of Commerce, 97, Cannon Street, E.C.4.

Trade Announcements

Messrs. Burch & Vertue, electrical engineers and contractors, of 13, High Street, Aldershot, have opened a radio department.

The Central Radio and Electrical Co. has opened premises at 98, Prince's Street, Stockport.

Mr. H. J. Gornall and Mr. J. W. Hodgkinson announce that they have entered into partnership as electrical and general engineers and have commenced business at 4, Chester Street, Shrewsbury. They ask for manufacturers' catalogues.

Brighton Home Life Exhibition

The seventh Home Life Exhibition was opened at the Corn Exchange and Dome, Brighton, on January 20th. On the stand of the Ideal Home Electrical Appliances, Ltd., were demonstrated violet ray, ozone and other medical appliances, and Diathermic Rays, Ltd., showed its "Neron-Vitalux" lamps. There were also a number of radio exhibits by local firms.

Prices of Materials

Messrs. F. Smith & Co. report, January 27th:—Electrolytic copper h.c. wire, 7 9/16d., 1/16d. inc. Silicium bronze wire, 8 15/16d., 1/16d. inc.

Messrs. Edward Till & Co. report January 27th:—India rubber, Para fine, 4d., ½d. decrease.

Messrs. James & Shakespeare report, January 27th: Copper bars (best selected), sheet and rod, no change. English pig lead, no change.

The Hungarian-German Tariff Agreement

Under a new commercial treaty between Hungary and Germany, the tariff on electrical measuring apparatus (other than meters) and their parts, imported from Germany into Hungary, has been reduced from 700 to 500 gold kronen per 100 kg.

Hoover's to Manufacture Here

As reported in the ELECTRICAL REVIEW of January 22nd, the recent transfer of the headquarters of Hoover, Ltd., the English branch of the Hoover Co., Ltd., of Canada, to a new building erected on a 10-acre site at Perivale, Middlesex, is a prelude to the manufacture of the company's vacuum cleaners in this country. The existing building is intended primarily for offices, stores and repair shops, but work on the adjacent factory proper has already been commenced, and it is anticipated that it will be under production in seven or eight months' time, and that eventually it will meet the requirements of the whole of the British Empire, except Canada.

The main reasons given for the decision to manufacture in England are: great increase in sales; this country is the most logical centre for distribution in the Empire; production is likely to be a little more economical; the necessary quality of labour is easily obtained in this country; and the departure of England from the gold standard gives advantages in export. The new works will be devoted at first to the assembly of parts received from Canada. It is estimated that 600 men will be employed when the factory commences production. Something like 330 kW of electrical plant will be installed, with a maximum demand of about 180 kW. The company is considering installing its own generating plant.

The present two-storey building (illustrated herewith) has a frontage of 521 ft. on Western Avenue, and a floor area of

The new Hoover building at Perivale

58,000 sq. ft. The total floor space when the factory is completed will be 100,000 sq. ft.

Some excellent examples of recessed, ceiling and wall lighting may be seen inside the new building. In the halls there are long narrow and vertical panels faced with "art" glass and plated-metal frames. These were designed by the architects, Messrs. Wallis, Gilbert and Partners. The consulting engineers were Messrs. Wilkinson and Partners, and the Wardle Engineering Co., Ltd., supplied the interior fittings, as well as twenty 500-W floodlight projectors for the exterior. Two 500-W spotlight projectors for the entrance were supplied by the General Electric Co., Ltd. Messrs. John Lightfoot, Ltd., carried out the installation work. Two electric water heaters for canteen use, etc., were supplied by Messrs. Bastian and Allen, Ltd.

New Catalogues and Lists

Donovan & Co., 47, Cornwall Street, Birmingham.—Pamphlet No. 3191 giving particulars of a.c. automatic "across the line" squirrel cage motor starters, type 709.

Radio Instruments, Ltd., Purley Way, Croydon.—An illustrated and priced catalogue of radio receivers, mains units, transformers, chokes, &c.

"Typerlite" Co., 86, Cannon Street, E.C.4.—A supplementary price list of heavy and light duty "Typerlites" for industrial purposes.

West Insulating Co., Ltd., 123D, Victoria Street, S.W.1.—Pamphlets containing particulars of the use and treatment of the company's insulating varnishes, instrument wires and insulating materials.

Ruston & Hornsby, Ltd., Lincoln.—An illustrated leaflet giving full details of a new range of airless injection cold starting oil engines.

Wardle Engineering Co., Ltd., Old Trafford, Manchester.—A 76-page catalogue of lighting equipment, tubular heaters, &c.

Electrical Enquipment & Carbon Co., Ltd., 107-111, New Oxford Street, W.C.1.—Pamphlets Nos. GG.1 and 2, describing respectively the "Gee-Gee" Corporation wash boilers and the "Margery Daw" washing machines.

Electric Depôt, Ltd., Pritchett Street, Aston, Birmingham.—A leaflet giving prices and particulars of steel frame cable racks.

Brush Electrical Engineering Co., Ltd., Falcon Works, Loughborough.—An illustrated booklet entitled "How a Power Company Uses 'Brush' Transformers."

L. G. Hawkins & Co., Ltd., 30/35, Drury Lane, W.C.2.—A folder relating to pendant lighting fittings.

Rheostatic Co., Slough.—A leaflet describing the new "Satchwell" room thermostat, type "K."

British Thomson-Houston Co., Ltd., Rugby.—Several publications referring to watt-hour meters, unbreakable grid resistances, lightning arresters, relays, starters, combined cut-outs and isolators, circuit breakers, &c.

Star Electro Carbons, 49, Cleveland Road, South Woodford, E.18.—A leaflet giving particulars of the "Star" air blower for cleaning electric motors, dynamos, &c.

Bankruptcy Proceedings

W. R. Blakeway (trading as Pearson & Co.), electrical contractor, 31, High Street, Southampton.—Ranking liabilities of £5,496, net assets of £727, and a deficiency of £4,769 were shown in this debtor's statement of affairs, when he appeared at the Court House, Southampton, on January 20th, for his public examination. Answering questions put by the Official Receiver, the debtor said that he opened a showroom to display the goods of a friend who was an electrical contractor. There had been no partnership agreement, the major portion of the business being conducted by the debtor. The business was commenced without capital, but debtor obtained an overdraft at the bank for £200. He had had to borrow large sums of money from friends to enable him to continue the business, as the overhead expenses had been heavy. The examination was adjourned.

L. A. Hackett, electrical engineer and contractor, 21, Crosby Road, Birkdale, Lancs, lately trading with another at 36, Spring Gardens, Manchester, and formerly at Albert Mills, Albert Street, Manchester.—This debtor recently applied for his discharge at the Court House, Quay Street, Manchester. A statement of affairs showed liabilities of £597, and assets of £145. It was stated that in 1919 the debtor joined in partnership with another, their business consisting mainly of the installation of electric lighting in buildings and supplying showmen with their requirements. In April, 1922, they also traded at another address in Southport. In September, 1924, the partnership was dissolved, and a meeting of the partnership creditors was held in February, 1925. The discharge was granted, subject to suspension of one month.

Moses (or Maurice) Haar (trading as Fleet Electric Service), 26, Ivy Lane, Newgate Street, E.C.—The debtor returns liabilities of £434 and assets "nil." The following are the principal creditors:—

	£		£
British Thomson-Houston Co., Ltd.	25	Foster Engineering Co., Ltd.	36
Central Cables & Accessories, Ltd.	48	General Electric Co., Ltd.	45
Electric Cables, Ltd. ...	27	Hobday Bros., Ltd. ...	30
		L. di Lito	25

Movitone Radio Co. (a firm), 660a, Holloway Road, N.—This firm, which carried on business as radio dealers, had a receiving order made against it on January 13th upon the petition of Messrs. W. Peck & Co., creditors for £101. The first meeting of creditors was held on Monday at London Bankruptcy Buildings, when it transpired that the debtor had only that day attended at the department for his preliminary examination. A resolution was passed for Mr. W. A. J. Osborne, Balfour House, Finsbury Pavement, E.C., to act as trustee of the estate.

A. J. Gridley (A. J. Gridley & Co.), electrical engineer, 170, Stockwell Road, S.W.—Receiving order made January 15th on debtor's own petition. First meeting January 27th and public examination April 14th, both at Bankruptcy Buildings, Carey Street, W.C.

J. T. Price, electrician, 7, Shaw Square, Billet Road, Higham Hill, Essex.—First meeting held January 27th. Public examination March 15th at Bankruptcy Buildings, Carey Street, W.C.

C. G. Smith, electrical contractor, 66, Lichfield Street, Wolverhampton.—First meeting held January 27th at the Official Receiver's office, 191, Corporation Street, Birmingham. Public examination February 4th at the County Court, 50, Queen Street, Wolverhampton.

A. Crump (Selwyn Electrical Engineering Co.), electrical engineer, 35, Hawkslade Road, Peckham Rye, S.E.—Application for discharge to be heard on February 10th at Bankruptcy Buildings, Carey Street, W.C.

B. Marsh, electrician, 17, Victoria Road, Brighton.—Application for discharge to be heard on February 25th at the Court House, Church Street, Brighton.

R. Ramsden, wireless and electrical contractor, 29, Gibbet Street, Halifax.—First and final dividend of 2s. 1d. in the £, payable January 27th at the Official Receiver's office, 12, Duke Street, Bradford.

P. A. Franks, electrical engineer's contractor, 5b, Bedford Square, Loughborough, Leics.—First and final dividend of 2s. 7½d. in the £, payable January 28th at the Official Receiver's office, 1, Berridge Street, Leicester.

B. T. Monier-Williams, electrical engineer, Bungalow River Bank, Shoreham-by-Sea.—Receiving order made January 15th on a creditor's petition.

R. J. C. Lovelock, electrician, 280, Portswood Road, Portswood, Southampton.—Receiving order made January 18th on debtor's own petition.

Company Liquidation

Richard Elleray, Ltd.—Winding up voluntarily. Liquidator, Mr. S. W. Clarke, 51, Highgate, Kendal.

Dissolutions of Partnership

Cook & Co., electrical engineers and wireless apparatus dealers, 211, High Street, and 4, New Street, Dudley.—Messrs. B. R. Churchill and S. G. Wilkinson have dissolved partnership. Debts will be received and paid by them in equal proportions. Mr. Churchill will carry on the business at 211, High Street, and Mr. Wilkinson will take over that at 4, New Street.

Better Lines Co., contractors for electrical transmission lines, Bird Street, Lichfield.—Messrs. J. L. Gaved and T. J. Kinsey have dissolved partnership, so far as concerns Mr. Kinsey, who has retired from the firm. Mr. Gaved will carry on the business in the same style.

Winding-up Petitions

Bury Lighting & Heating Co., Ltd.—A petition for the winding up of this company has been presented to the County Court of Lancashire by the General Electric Co., Ltd., and Bankers Commercial Security, Ltd. It will be heard at the Court House, Mawdsley Street, Bolton, on February 10th.

Symentis Products, Ltd.—A petition for the winding-up of this company has been presented to the Court of Chancery of the County Palatine of Lancaster by Jackson & Brother, Ltd., and will be heard in Manchester on February 1st.

Electricity Supply

Lighting, Domestic, Power

Abram (Lancs).—AGREEMENT WITH POWER COMPANY.—The Urban District Council has consented to the Lancashire Electric Power Co.'s laying a cable along Warrington Road on the understanding that overhead lines will be allowed where practicable, that electrical fittings will be installed at 36 houses being erected in Kingsdown Road and in the Council offices, and that the company will also undertake to install electrical fittings in 50 Council houses in Kingsdown Road and May Avenue on a deferred-payment system.

Ashby-De-La-Zouch.—SUPPLY TO THRINGSTONE.—It was reported at a recent meeting of the Rural District Council that the Leicestershire & Warwickshire Electric Power Co. was to proceed as quickly as possible with the supply of electricity to Thringstone.

Blackpool.—LOANS.—To meet estimated requirements for three years the Electricity Committee is applying for sanction to loans of £7,500 for new cookers and other appliances, £19,500 for the extension of electricity services, and £30,000 for continuing the change-over of frequency.

Brighton.—SUPPLY TO NEIGHBOURING VILLAGES.—The Electricity Committee is applying for an Order to supply the parishes of Poynings, Fulking and Newtimber, the cost being estimated at £5,250. A supply is to be given to the Ladies Mile Estate at Patcham at a cost of £15,000, and the Committee states that it has interested Messrs. George Ferguson and Sons, who are developing the estate for the erection of 850 houses, in an all-electric scheme, and that all the houses will be wired for lighting and power.

LOAN SANCTIONED.—Sanction to a loan of £1,420 has been received in connection with the supply of electricity to the village of Ovingdean.

Canada.—REORGANISATION OF BEAUHARNOIS CORPORATION.—*The Times* states that conferences have been in progress at Ottawa between ministers on the one hand and representatives of the Beauharnois Light, Heat, and Power Corporation, the banks, and other parties interested in its fortunes on the other. Construction work on the Corporation's scheme has been proceeding continuously and has made substantial progress, but three important Canadian banks, which have been providing the necessary funds, are now indisposed to make further advances until the fate of the project is definitely settled. The object of the conferences was to work out a plan which would permit a reorganisation of the company and enable it to secure funds by a bond issue and at the same time safeguard the public interests, particularly with regard to the navigation of the St. Lawrence. It is understood that an agreement has been virtually reached which will be satisfactory to all concerned. The agreement will involve the resignation of the majority of the present directorate and the appointment of another board on which the banks will have representatives.

Carlisle.—PREPAYMENT METERS.—The City Council has decided to provide penny prepayment meters for electricity consumers.

Coventry.—EXTENSIONS.—The Electricity Committee is to apply for sanction to a loan of £7,375 for extensions.

Croydon.—EXTENSIONS.—The Electricity Committee has prepared estimates totalling £62,742 for extensions during the next twelve months.

STREET LIGHTING.—Sanction to a loan of £10,000 for street lighting has been applied for.

Derby.—ASSISTED WIRING SCHEME.—Under the Corporation's assisted wiring scheme over 2,860 installations have been made, and the total number of applications is now 3,799. During the coming year the Electricity Department will spend over £10,000 on the scheme.

Dundee.—WEEKLY CHARGES FOR CORPORATION TENANTS.—It was reported to the Electricity Committee at a recent meeting that tenants in slum clearance areas occupying Corporation houses were using candles and lamps because they could not afford to pay quarterly bills for electricity. It was recommended that the difficulty might be surmounted by collecting the electricity bill in weekly instalments.

Ealing.—LOANS.—The Electricity Committee is to apply for sanction to loans of £11,000 for mains and £9,000 for plant.

Eastbourne.—EXTENSIONS.—The Corporation has forwarded to the Rural District Council plans for the extension of the electricity supply to Wannock, Polegate, Folkington, Wilmington, Stone Cross, Blackness, Westham and Pevensey. It is proposed to place cables underground through the parishes of Pevensey and Westham, instead of overhead, in order to preserve the amenities of Pevensey Castle.

Faversham.—DEPUTATION TO COMMISSIONERS.—The Town Council has deputed the borough electrical engineer and the town clerk to interview the Electricity Commissioners to ascertain whether, in the event of the Council's obtaining a bulk supply from the Kent Electric Power Co., it would be permitted to continue the d.c. distribution, and if so if the Commissioners would be prepared to consider favourably an application for the installation of the necessary convertor plant. If the replies are favourable negotiations will be opened with the company for a bulk supply.

ELECTRICITY FOR FLOODLIGHTING.—The Town Council has decided to supply electricity for floodlighting at 2d. per kWh.

Glasgow.—MAINS EXTENSIONS.—The Electricity Committee recommends the extension of mains at a cost of £1,735.

PROGRESS DURING DECEMBER.—Under the Electricity Department's scheme 207 houses were wired in December, making the total to date 35,078, while hired appliances numbered 35, bringing the total to 20,706.

STREET LIGHTING IMPROVEMENTS.—A scheme of electric lighting has been inaugurated on a portion of the main Glasgow-Paisley Road.

Glendale (Northumberland).—NO OVERHEAD LINES AT FLODDEN.—Following an objection by the Rural District Council to the erection of a 132,000-V line over the battlefield at Flodden, the Central Electricity Board has decided to take the line by an alternative route over part of Lord Joicey's Ford estate at an extra cost of £700.

Glossop Dale (Derby).—SUPPLY TO CHARLESWORTH.—The High Peak Electricity Board has arranged to give a supply of electricity to Charlesworth at an early date.

Gosforth.—CHANGE-OVER.—The Newcastle-upon-Tyne Electric Supply Co., Ltd., has commenced the changing over of the supply in the South Gosforth area from d.c. to a.c., and it is expected that the whole work, which is to be carried out in three sections, will be completed in a month.

Hampton (Surrey).—MAINS EXTENSIONS.—The London and Home Counties Joint Electricity Authority has notified the Urban District Council of its intention to extend mains in Percy Road, Upper Sunbury Road, and Tudor Road, Hampton; Hally Road, Hampton Hill; and Queen's Road and Park Road, Teddington.

WIRING SCHEMES FOR HOUSING ESTATES.—The Council is in communication with the Authority with regard to wiring schemes in various housing estates.

Harlech.—TRANSFER OF UNDERTAKING.—The North Wales Power Co. has reached agreement with the owners of the Harlech electricity undertaking for the transfer of that undertaking to the company. Work is now being carried out in changing over the system to a.c. At the last meeting of the North Wales and South Cheshire Electricity Board, it was reported that during last quarter the company had added 811 new consumers, bringing the total to 12,901 (exclusive of bulk supplies), and that the load was approximately 15,750 kW. Nearly 600 electric cookers are in use.

Hexham (Northumberland).—OVERHEAD LINE EXTENSIONS.—The Newcastle-upon-Tyne Electric Supply Co. has notified the Rural Council of its intention to apply for sanction to extend its main overhead line from Barrasford to Bellingham,

Hornsey.—CONCESSION TO LARGE CONSUMERS.—The Electricity Committee recommends that in the case of all shops where the consumption of electricity for ordinary lighting purposes amounts to 10,000 kWh per annum or over an annual allowance shall be made of one-half per cent. for every one per cent. of the consumer's load factor. For the purpose of calculating the amount of the allowance referred to it is suggested that in the case of several properties belonging to one consumer the energy consumed on all the properties shall be aggregated and the load factors averaged.

Hoylake.—CHEAPER ELECTRICITY.—The flat rate charge for lighting is to be reduced from 5½d. to 5d. per kWh.

Keswick (Cumberland).—BOARD'S OFFER ACCEPTED.—After a long discussion the Town Council has decided to accept the offer of the Central Electricity Board to place cables underground for 2,000 yards in the Keswick area in connection with the electricity scheme. The Board is also recommended to put 1,000 yards underground at a point agreed upon by the National Trust.

Kettering.—SUB-STATION EQUIPMENT.—The Electricity Committee is to apply for sanction to a loan of £3,000 for sub-station equipment and kiosks. Additional plant is to be purchased for the Market Harborough sub-station at an estimated cost of £415.

CHANGE-OVER.—Sanction to a loan of £3,000 in connection with the change-over of supply is also to be applied for.

Littleham (Devon).—INAUGURATION OF SUPPLY.—A supply of electricity was switched on at the village on January 16th, and it is expected that negotiations now in progress between the Council and the East Devon Electricity Co., Ltd., will result in the introduction of public lighting shortly.

Liverpool.—THE CLARENCE DOCK STATION.—The Clarence Dock power station, which has so far cost £1,250,000, and when completed will cost £7,000,000, is now in part commission. After several months' experimental running, one of the two 50,000-kW turbo-generators in the completed section of the station has been brought into regular use and, in conjunction with the Lister Drive station, is sharing the Liverpool load. The maximum demand is about 120,000 kW, the generator at Clarence Dock station at present providing 30,000 kW.

London.—BATTERSEA.—The Electricity Committee proposes to provide electricity services to 141 premises at a cost of £1,426, and replace old vulcanised bitumen distributors with armoured cable in various roads at a cost of £6,083.

HAMMERSMITH.—The Electricity Committee recommends that a supply of electricity be given to the new Freemasons' Hospital, Ravenscourt Park, at an estimated cost of £3,334, and to the new cinema of the Gaumont-British Picture Corporation, Ltd., in Queen Street, at a cost of £2,063.

WOOLWICH.—The Borough Council is to spend £29,000 on cable extensions and £17,000 on general improvements of the supply system.

HACKNEY.—The Electricity Committee is applying for sanction to a loan of £8,000 for mains extensions.

Luton.—OVERHEAD LINES.—The Town Council has received permission from the Ministry of Transport to use overhead lines between Eaton Bray and Cheddington, with a branch line in the parish of Ivinghoe, and in the parishes of Pitstone, Ivinghoe and Mentmore, Houghton Regis, Flitwick and Toddington. Sanction has also been received to a loan of £5,512 for mains for the village supply.

Mid-East England.—SPECIAL ORDER.—The Electricity Commissioners have submitted to the Minister of Transport a Special Order made by them authorising Mr. R. Borlase Matthews to supply electricity in parts of the counties of Leicester, Rutland, Northampton, and the Soke of Peterborough.

Newcastle-on-Tyne.—OPPOSITION TO COMPANY'S BILL.—The Parliamentary Committee recommends the Council to oppose the Bill being promoted by the Newcastle-upon-Tyne Electric Supply Co., Ltd., which provides for the transfer to the company of undertakings belonging to certain other companies.

Newport (Salop).—RING MAINS.—The West Midlands Joint Electricity Authority has sanctioned the erection of an 11,000-V ring main with l.p. distribution in the following parishes round Newport: Chetwynd, Pickstock, Sambrook, Howle, Tibberton, Cherrington, Adney, Edgmond, Donnington, Lilleshall, Woodcote and Chetwynd Aston. The Authority has also sanctioned a similar line linking Newport with Shifnal, and passing through the villages of Weston Heath, Chadwell, Heath Hill, Sheriffhales, Crackley Bank and Haughton. The latter is regarded as the most urgent line because it will serve as a link between Newport and Shifnal in the event of a failure occurring on the line from Ironbridge *via* Wellington.

Peterborough.—SUPPLY IN RURAL DISTRICT.—The Rural District Council has sealed an agreement with the Corporation which is undertaking to carry out installations at Council houses.

Rawtenstall.—DUNNOCKSHAW ASKS FOR ELECTRICITY.—Dunnockshaw on the moorlands between Rawtenstall and Burnley is asking for a supply of electricity from Rawtenstall. Provided that certain guarantees are given the Corporation proposes to apply for an Order to supply the district.

Southend-on-Sea.—ELECTRICAL EXHIBITION.—The Town Council has decided to hold an exhibition of electrical apparatus in the early spring.

South Shields.—STREET LIGHTING IN HIGH SHIELDS.—The South Shields Chamber of Trade has decided to write to the Town Council on the question of improving the street lighting in certain parts of High Shields.

Swansea.—SUPPLY TO COLLIERY.—The South Wales Power Co., Ltd., is to provide a supply of electricity to the Garn Goch Colliery.

Tynemouth.—SUB-STATION EQUIPMENT.—The Electricity Committee is applying for sanction to the borrowing of £1,000 for sub-station equipment.

Uckfield.—EXTENSIONS.—The Rural District Council has received notice from the Uckfield Gas and Electricity Company and the Electric Supply Corporation, Ltd., of their intention to extend overhead h.p. lines with underground l.p. mains at Cooper's Green, Buxted.

United States.—EXTENSION SCHEMES FOR 1932.—A $31,000,000 programme of construction for 1932 has been approved by the Pacific Gas & Electric Co., providing for the erection of a 50,000-kW thermal plant at the southern end of the San Joaquin Valley and the development of an additional 56,000 h.p. of hydro-electric energy from its Mokelumne scheme. Over $11,000,000 will be spent by Southern California Edison Co., Ltd., mainly on distribution lines and sub-stations, while the Detroit Edison Co. proposes to spend $10,000,000 on power stations, transmission system improvements, &c.

Venezuela.—INCREASED DEMAND FOR ELECTRICITY.—The demand for electrical energy in Caracas has developed considerably during recent years. The Sociedad Electricidad de Caracas therefore decided late in 1930 to build a new steam-operated power station at La Guaira. The contract was placed with the Brown-Boveri Co., and the station is being constructed in two sections, the first of which will include the installation of two turbo-generators having outputs of 4,000 kW and 5,000 kW, respectively. The second stage will increase the capacity of the station to 25,000 kW. The boiler plant for the first section will be composed of three oil-fired units, two of which have been ordered from Messrs. Babcock & Wilcox, Ltd.

West Hartlepool.—LOAN SANCTIONED.—The Electricity Committee has received sanction to a loan of £5,000 for mains extensions and services.

Wigan.—CANVASS OF ALMOND BROOK DISTRICT.—The Rural District Council has requested the Corporation to make a canvass of Almond Brook and district in order to ascertain the number of prospective consumers of electricity.

New Brompton and Kensington Showrooms

THE fact that practically all the premises in its supply area use electricity and that there is consequently little opportunity for increasing the number of its consumers, has prompted the Brompton and Kensington Electricity Supply Co., Ltd., to embark upon intensive development work. One result is the opening at the company's premises at 254, Earl's Court Road, S.W.5, of palatial new showrooms, and a demonstration centre of the most up-to-date design.

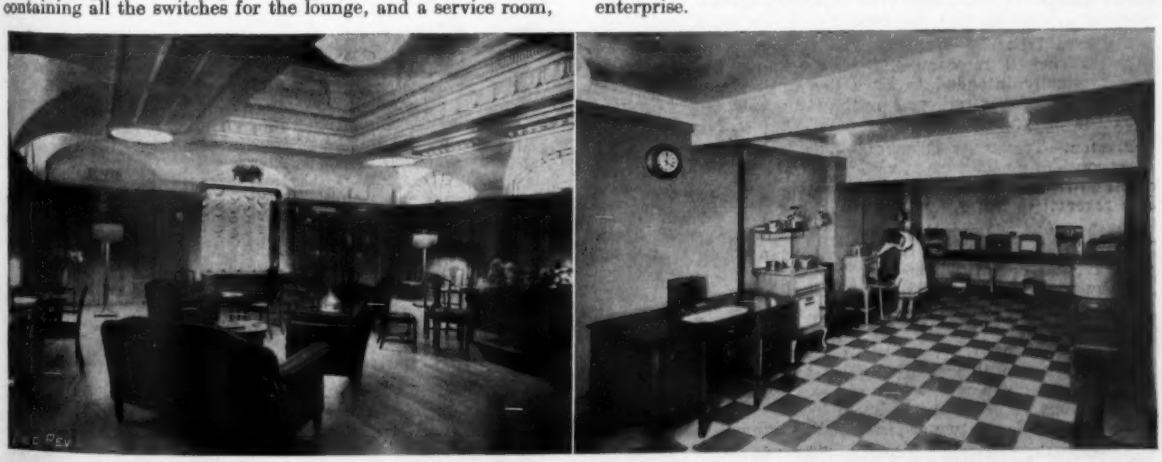
For the reception of visitors a comfortable lounge, 45 ft. square and panelled throughout in mahogany, has been provided, and at one end of this is a small stage intended primarily for demonstrations or lectures, power points being available for connecting up any domestic appliance. A draped muslin screen can be lowered at the back of this stage for the demonstration of colour lighting effects, and a white screen is also available for the projection of films and lantern slides. Along the walls are arched window openings or fanlights and behind these are alcoves into which colour lighting can be projected by means of footlight boxes and screens. A radio-gramophone is also installed.

On the right on entering the lounge are a " dimmer " room, containing all the switches for the lounge, and a service room, from which morning coffee and afternoon tea may be served, while on the left is a passage leading to the laboratory and the still room, where light refreshments can be prepared for visitors. Down a short flight of stairs is a large showroom, one half of which is specially equipped for the demonstration of bathroom appliances, and the other half for the display of electric cookers and fires. In a bay window a chromatic lighting exhibit has been installed.

Below the lounge is perhaps the most interesting and original feature of the new premises. This is a small demonstration room where visitors themselves are allowed to experiment with the simpler forms of cooking apparatus, the ingredients required—not to mention the overalls—being provided by the company. A large meter records the actual consumption of the apparatus in use, and demonstrators are at hand to answer questions or render any assistance.

The showrooms on the ground floor are devoted to the exhibition of lighting fittings and domestic appliances generally.

Mr. R. S. Downe, the general manager and engineer, is very optimistic regarding the success of the company's latest enterprise.



The consumers' lounge and the cooker and radiator department at the new B. & K. showrooms

Traction

Australia.—SYDNEY.—According to the Sydney *Morning Herald*, negotiations are almost completed between the State Government and the Victorian Construction Pty., Ltd., for the construction of the Quay railway station and the first section of the Eastern Suburbs underground railway. The scheme, which is estimated to cost between £8,000,000 and £10,000,000, is subject to the approval of the State Parliament and the Town Council. It is proposed to construct immediately a line between St. James Station to Bondi Junction, and it is understood that a continuation of the line is also contemplated through Waverley, Randwich, Daceyville, Mascot, St. Peters and Erskineville to join up with the main suburban line at Redfern.

Bacup.—PROPOSED TRAMWAY ABANDONMENT.—Negotiations are in progress between Bacup and Rawtenstall Corporations for 'buses to be substituted for tramcars on the route between these centres at an early date.

Bournemouth.—TRAFFIC SIGNALS.—The Roads Committee has decided to provide automatic traffic signals at four road junctions.

Chelmsford.—TRAFFIC SIGNALS.—The Watch Committee is to install automatic traffic signals at two traffic junctions.

Continental.—GERMANY.—According to *The Times Trade and Engineering Supplement*, the German State Railways are constructing an oil-electric rail-coach which embodies some novel features. Trial runs, at a speed of 150 km. an hour, are to be carried out as soon as the coach is completed, and it is to be put into service in the spring on the Berlin-Hamburg line. The coach is made up of two parts joined by means of flexible gangway bellows. Each of the outer ends is supported by a bogie, the inner ends having one bogie in common. Each of the outer bogies carries a Diesel engine of 410 h.p. directly coupled to a dynamo. The electrical equipment is by Siemens-Schuckert. There is seating accommodation for 102 and the total length of the combined coach is 138 ft. and the weight 77 tons.

ITALY.—By the completion of the section between Naples and Capo di Sannio, the whole of the railway between Naples and Foggia has now been electrified.

SWITZERLAND.—The work of electrifying the railway between Basle and Delsberg, a distance of about 24 miles, has recently been completed and trains, operated by 15,000-V single-phase a.c., are now running over the line.

Croydon.—PEDESTRIAN-OPERATED TRAFFIC SIGNALS.—Traffic signals which can be operated by pedestrians are to be installed immediately by the Corporation on the main London-Brighton road at a cost of about £400. They will hold up the traffic for a period of twenty seconds, after which it will be impossible to operate them again for two minutes.

RENOVATION OF TRAMWAY STANDARDS.—The Tramways Committee is to reinforce about 600 tramway standards, which have been in use for thirty years, at a cost of £1,200.

Dundee.—DOUBLING OF TRACK.—The Transport Committee is to spend £2,890 on doubling a portion of the tramway track.

Glasgow.—INCREASED FARES.—The Corporation has decided to increase the maximum charge on the tramways from 2d. to 2½d. and the halfpenny fare for children is to operate only between noon and 2 p.m.

Leeds.—PROPOSED TRAMWAY ABANDONMENT.—The Leeds and Morley Corporations are considering the abandonment of the tramway service between the two towns.

London.—DEFICIT ON TRAMWAYS.—The revised estimates for the year 1931-32 show a net deficiency of £88,196 on the L.C.C. Tramways. A net surplus of £63,804 was originally estimated.

Newcastle-upon-Tyne.—THE OSBORNE ROAD ROUTE.—The question of relaying the tramway track in Osborne Road is to be reconsidered by the Transport and Electricity Committee. The City Council decided some time ago to relay the tramway track instead of introducing an omnibus service, but controversy has arisen and the matter is to be reconsidered.

Northern Ireland.—BELFAST.—The Corporation has decided to reconstruct 30 tramcar bodies for the municipal service. It was originally intended to have the work done by tender, but the matter was returned by the Council to the committee with the suggestion that it be done by direct labour.

Preston.—TRANSPORT DECISION.—The Transport Committee, after considering the type of vehicle to use on Farringdon Park and Penwortham routes, has decided upon petrol 'buses. This is a reversal of a previous resolution to run trolley-'buses.

Scarborough.—DIESEL-ELECTRIC RAILCAR'S SUCCESS.—The new Diesel-electric railcar built by Sir W. G. Armstrong Whitworth and Co., has completed successful trials on the Scarborough-Whitby route of the L.N.E.R. The car broke its own speed record of 65 m.p.h. and the fuel costs at ¾d. a mile were half the fuel costs of a steam locomotive.

Tees-side.—MORE TROLLEY-'BUSES PURCHASED.—The Tees-side Railless Traction Board has decided to spend £12,000 on the purchase of eight new 32-seater vehicles made by Messrs. Ransomes, Sims & Jefferies, Ltd. It has also been decided to renew the cable on two sections of the line.

Tynemouth.—TRAFFIC SIGNALS.—The Watch Committee recommends the provision of automatic traffic signals at an estimated cost of £688.

Communications

Albania.—PROPOSED BROADCASTING STATION.—An American concern has submitted plans to the Government for the erection of a high-power station, says *World-Radio*. Transmission by amateurs has apparently been going on for some time between a station at Zevoli and one at Vallona. Originally using frequencies of 662 and 652 kc respectively, that of Zevoli has been reduced to 645 kc and that of Vallona to 622 kc in order to obviate interference with other stations.

Australia.—NEW BROADCASTING STATION.—The most modern and powerful broadcasting station in Australia, erected by the Postal Department, has just been opened at Corowa, New South Wales. It transmits on a wavelength of 536 metres, the longest of any of the Commonwealth stations, and the service range is about 90 miles. Power is received from the Yalbourn electricity supply works in Victoria, and a complete emergency generating plant has been installed. The station was opened by Mr. H. P. Brown, director of Postal Services, and Mr. Stuart Doyle, managing director of the Australian Broadcasting Company.

Canada.—TELEPHONY.—On January 25th the Governor-General opened the all-Canada telephone system, which represents the co-operative enterprise of the seven major telephone systems of Canada and offers continuous and direct service between the Atlantic and Pacific coasts of the Dominion. Speaking into a telephone with which connection had been made with the capitals of the nine Provinces, Lord Bessborough made a brief address. The Lieutenant-Governors of the different Provinces, or their deputies, each made a short reply, and every word of each address was audible in all the linked stations, says *The Times*.

It has been possible for many years to hold telephone conversations between far eastern and far western towns, but it has been necessary for the calls to be routed partly *via* the Bell lines in the United States. The new system will keep such telephone talks on Canadian territory and the system will be managed by a committee with executive representatives from each component system and a clearing house will apportion the receipts between them.

Germany.—RADIO LICENCES.—In spite of a decline in every other branch of revenue, the Ministry of Posts and Telegraphs has announced that the number of licensed radio listeners is now four millions, including 275,000 free licences issued to blind people, hospitals, etc. A licence costs sixpence per week; 60 per cent. of the revenue is retained by the Ministry and the balance is distributed among the broadcasting stations. The *Observer's* Berlin correspondent explains that "pirates," who risk confiscation of their receiving sets as well as being fined, are few, since "common informers" are very active.

Durham.—CARRIER TELEPHONY.—The Newcastle-upon-Tyne Electric Supply Co. has been carrying out experiments at Potter Houses for the utilisation of the high-voltage grid power lines of the Central Electricity Board for carrier-wire telephone purposes. It is stated that there is little possibility of the carrier-wave system being adopted between large centres, but it may be introduced into isolated parts where it will not pay the Post Office to run telephone lines. It is said to be possible to hear conversation distinctly at a distance of 40 miles.

London.—STANDARD RADIO TRANSMISSIONS.—The secretary of the Department of Scientific and Industrial Research announces that the present programmes of standard frequency transmissions on the first and third Tuesday afternoons of each month from station 5HW at the National Physical Laboratory have been discontinued. They will be replaced by specially modulated transmissions in accordance with a programme which will be announced at a later date. The three-monthly evening transmission on 1,785 kilocycles will be continued as at present. Particulars of this transmission can be obtained from the Department, 16, Old Queen Street, S.W.1.

Newcastle-upon-Tyne.—SHIP-SHORE TELEPHONY.—It is understood that the Tyne Improvement Commission is considering extending ship-to-shore telephone facilities on the Tyne.

South Africa.—RADIO-TELEPHONY.—It is understood that a direct radio-telephone service between London and Cape Town is to be inaugurated on February 1st. The public will be able to book personal calls. A minimum of £6 will be charged for three minutes' conversation, plus £2 for each additional minute.

TELEGRAPHY.—The Overseas Communications Co. of South Africa has moved its Cape Town headquarters from 44, Long Street to Kodak House, Shortmarket Street. The new instrument room occupies the entire third floor of the building. Kodak House was previously the home of the Wireless Telegraph Co., which operated the beam service before its amalgamation with the Eastern Cable Co.

United States.—CARRIER TELEPHONE CABLE.—A new submarine cable has recently been laid between Key West and Havana in order to provide more telephone facilities between the United States and Cuba. The cable has a single central conductor and a concentric tape return, and it is insulated with the recently developed material known as "paragutta." Three carrier telephone channels are available at present, but the use of a wider frequency range would furnish additional channels. For example, if the ultimate capacity were six telephone channels, two of them could be used for telegraphy. The cable would then carry simultaneously a total of four telephone and twenty-four or more two-way telegraph messages.

Contract Information

When "Contracts Open" are advertised in our "Official Notice" pages the date of the "Electrical Review" containing the advertisement is given in parentheses below

Contracts Open

Aberlour (Banffshire).—February 6th. Various works, including electric lighting in connection with the reconstruction of Aberlour Orphanage. Specifications, &c., from Alex. Ross & Son, architects, Inverness (deposit £1 1s.).

Banbury.—February 6th. Education Committee. Electric lighting installation at the Grimsbury Council Schools. Specifications from the sanitary inspector, Municipal Buildings, Marlborough Road, Banbury.

Blackburn.—February 29th. Electricity Department. Insulated cable and wire and meters. (January 22nd.)

Blackwell (DURHAM).—County Education Committee. Electric lighting installation at the Blackwell Council School. Particulars from Mr. F. Willey, county architect, 34, Old Elvet, Durham.

Dundee.—February 1st. Public Health Department. Electric lighting installation and wiring for motors and cookers at the administrative block, Maryfield Hospital. Particulars from the city quantity surveyor, 91, Commercial Street.
February 10th. Electricity Department. E.h.p. and l.p. cable. (See this issue.)

Farnworth.—February 5th. Electricity Department. L.p. cables. (January 22nd.)

Gainsborough.—February 10th. Electricity Department. L.p. cables, meter boards, and joint box compound. (See this issue.)

Glasgow.—February 10th. Education Committee. Heating installation at St. Thomas's (New) R.C. School. Specifications, &c., from the Education Offices, 129, Bath Street (deposit £1 1s.).

Haddington (EAST LOTHIAN).—Town Council. Various works (including electrical) at housing scheme. Schedules, &c., from Mr. W. W. Reid, burgh architect, 14, Court Street.

Hastings.—February 9th. Electricity Department. General stores. (January 22nd.)

Hazel Grove and Bramhall.—February 8th. Urban District Council. Meters. (See this issue.)

Hull.—February 15th. Electricity Department. Static transformers and electric lamp posts and brackets. (See this issue.)

India.—NEW DELHI.—February 11th. Indian Stores Department. Screwed enamelled steel conduit pipes and fittings. (G.X. 11108.)*

Leeds.—February 16th. Electricity Department. General stores. (See this issue.)

Lithuania.—KAUNAS (KOVNO).—February 3rd. Administration of Posts and Telegraphs. 450 table telephones, 50 wall telephones, &c. (A.X. 11227.)*

London.—CENTRAL ELECTRICITY BOARD.—February 15th, Central indication and telephone equipment and supervisory control equipment in the North-West England and North Wales area. (December 18th.)
February 29th. 33-kV overhead transmission lines for South Scotland Electricity Scheme. (See this issue.)
FULHAM.—March 7th. Borough Council. Generating station extensions. (See this issue.)
ISLINGTON.—February 19th. Borough Council. Street lamp columns with bases and fittings. (January 22nd.)
HAMMERSMITH.—February 24th. Borough Council. General stores, including electrical requisites. (See this issue.)

Manchester.—February 9th. Transport Committee. Permanent way points, tongues and crossings, and general stores. Schedules from the general manager, Corporation Transport Dept., 55, Piccadilly, Manchester.
February 8th. 6,600-V metal-clad bus section switchgear units. (See this issue.)

New Zealand.—WELLINGTON.—March 1st. Post and Telegraphs Department. 250 gongs. (A. 11230.)*
May 3rd. Public Works Department. 110- and 33-kV outdoor switchgear and steelwork for Waitaki power scheme. (A.X. 11233.)*

Oldham.—February 9th. Gas Works Committee. Electric wiring of power plant at the Higginshaw gasworks. (See this issue.)

Plymouth.—February 15th. Corporation. Meters, time switches, underground cable, transformers and e.h.p. and l.p. switchgear. (January 22nd.)

Portsmouth.—February 2nd. Tramways Committee. General stores. (January 22nd.)

Rotherham.—January 30th. West Riding Public Health and Housing Committee. Electric lighting installation at Tuberculosis Dispensary. Particulars from the county architect, County Hall, Wakefield.

South Africa.—JOHANNESBURG.—February 13th. City Council. Automatic traffic signals. (A.X. 11235.)*
DURBAN.—March 18th. Corporation. Tramway rails, &c. Specifications from Webster Steel & Co., 9, St. Helen's Place, E.C.3.

Stanley.—February 2nd. Urban District Council. Electricians' work at 50 houses on the Moor House Estate. Particulars (deposit £2 2s.) from Mr. S. Grove, clerk to the Council, Pearl Chambers, East Parade, Leeds.

Swansea.—February 17th. Electricity Department. General stores. (See this issue.)

West Midlands.—Joint Electricity Authority. February 10th. 11,000-V overhead lines on wood poles. (January 22nd.)

Wolverhampton.—February 15th. Electricity Department. E.h.p. metal-clad switchgear. (January 22nd.)

* Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

Contracts Closed

Croydon.—Sewage Committee. Recommended. Electric crane for sewage works (£720).—Taylor & Hubbard.
Electricity Committee. Recommended. Two 750-kW transformers (£569).—Crompton Parkinson, Ltd. One 300-kVA transformer (£185), one 500-kW transformer (£242), one 250-kW transformer (£130), and two 500-kVA transformers (£505).—British Electric Transformer Co., Ltd. Switchgear equipment (£1,258) and reactor (£327).—Metropolitan-Vickers.

Dundee.—Corporation. Accepted. Electric lighting at the Broughty Ferry housing scheme.—Stenson & Co.

Durham.—County Education Committee. Accepted. Installation of electric light in schools: St. John's Chapel Council School.—Sleigh and Wood. Wearhead, Westgate, and Middleton St. George's Schools.—W. Sykes & Sons.
County Assistance Committee. Recommended. Electrical installation at Lanchester institution (£740).—Palliser Bros.

Faversham.—Rural District Council. Provisionally accepted. Installation of electric lighting plant at the Beacon Hill Isolation Hospital (£197).—G. E. Wallis & Sons, Ltd.
Town Council. Accepted. Wiring 50 houses for electric lighting.—W. Mellor.

Glasgow.—Corporation. Electricity Committee. Accepted. Plant and appliances required in connection with the change of frequency. Thirty-one motors (£3,505).—B.T.H. Co. Four new motors, five re-wound motors, and 23 meters (£2,074).—Metropolitan-Vickers. Fifty-five re-wound motors (£1,525).—Fraser & Borthwick. Two new motors (£362).—Mavor & Coulson. Two static condensers with switchgear (£217).—B.I. Cables, Ltd. Twenty new motors (£1,053).—Lancashire Dynamo and Motor Co. Seventy-four new motors (£1,306).—Crompton Parkinson. Eight stators exchanged, two new motors, and three motors exchanged (£94).—Keith, Blackman Co. Meters reconditioned (£338).—Edison Swan Electric Co. Twelve new motors (£361).—English Electric Co. One new motor (£120).—Newtons (Taunton).
Transport Committee. Recommended. Knightswood garage lighting.—Holophane, Ltd. Additional switchgear for Pinkston.—General Electric Co., Ltd.

Great Yarmouth.—Town Council. Accepted. Coaling apparatus for a new boiler at the electricity works (£1,183).—Mitchell Conveyor Co.

Grimsby.—Electricity Committee. Recommended. Two 1,000-kW transformers (£716).—Brush Electrical Engineering Co., Ltd.

Hornsey.—Works Committee. Recommended. Wiring at baths (£177).—Alpha Manufacturing & Electrical Co., Ltd.
Electricity Committee. Recommended. Remote control equipment (£1,946).—A. Reyrolle & Co., Ltd.

London.—STEPNEY.—Electricity Supply Committee. Recommended. New switchboard meters and overhauling and converting two existing meters to 250 V d.c. at Whitechapel substation (£160).—Aron Electricity Meter, Ltd.
HAMMERSMITH.—Electricity Committee. Recommended. E.h.p. 3-phase metal-clad switchgear for Gaumont Palace Cinema (£1,055).—A. Reyrolle & Co., Ltd. Cable (£250).—Hackbridge Cable Co., Ltd.
GREENWICH.—Works Committee. Recommended. Electrical work at Chevening Road welfare centre (£120).—W. S. Fitzgerald.

Southend-on-Sea.—Town Council. Accepted. Two four-wheel trackless trolley vehicles (£4,343).—English Electric Co., Ltd. Change-over of electricity consumers' apparatus, Gainsborough Drive (£140).—W. Jay, Ltd.

Forthcoming Events

Junior Institution of Engineers.—Friday, January 29th. Institution, London. 7.30 p.m. "Centrifugal Separation of Liquids—Industrial Applications to Oils and other Fluids." Mr. J. J. Haslam.

Institution of Mechanical Engineers.—Friday, January 29th. Institution, London. 6 p.m. "The Mechanism of Electric Locomotives." Mr. J. D. Twinberrow.

Association of Mining Electrical Engineers (*London Branch*).—Tuesday, February 2nd. Junior Institution of Engineers, London. 6.45 p.m. "Transmission Line Construction." Mr. A. M. E. Maylett.

British Electrical Development Association (*North Midland Area*).—Wednesday, February 3rd. Electricity Offices, Bradford. "Home Lighting." Miss D. Noakes. (*Northern Counties Area*).—Thursday, February 4th. Sopwith's Lounge, Newcastle-upon-Tyne. "Selling Talk—My Experiences on the Road." Mr. J. Newcombe.

Institution of Electrical Engineers.—Thursday, February 4th. Connaught Rooms, W.C. 7 for 7.30 p.m. Annual dinner. (*London Students' Section*).—Friday, January 29th. Institution, London. 6.15 p.m. "The Starting of 3-Phase Induction Motors." Mr. J. F. Veevers. "The Automatic Control of a Large Bookbinding Machine." Mr. E. H. K. Palmer. Saturday, January 30th. 2.30 p.m. Visit to the Grove Road power station, St. John's Wood, N.W. (*Dundee Sub-Centre*).—Tuesday, February 2nd. Lamb's Restaurant, Dundee. 7.30 p.m. Informal discussion on "Experiences with the Public." (*North-Western Students' Section*).—Tuesday, February 2nd. Engineers' Club, Manchester. 7.15 p.m. "Power Supply to Direct-Current Traction Systems." Mr. C. S. Whiteley. (*Wireless Section*).—Wednesday, February 3rd. Institution,

London. 6 p.m. "The Spreading of Electromagnetic Waves from a Hertzian Dipole." Messrs. J. A. Ratcliffe, L. G. Vedy, and A. F. Wilkins. (*North-Western Centre*).—Thursday, February 4th. Engineers' Club, Manchester. 7 p.m. Joint meeting with Institution of Mechanical Engineers. "The Mechanism of Electric Locomotives." Mr. J. D. Twinberrow. (*Meter & Instrument Section*).—Friday, February 5th. Institution, London. 7 p.m. "Recent Developments in Cathode-Ray Oscillographs." Dr. A. B. Wood.

Institute of Fuel.—Thursday, February 4th. The University, Bristol. 7.30 p.m. Joint meeting with the Society of Chemical Industry. "Smoke Abatement." Mr. V. R. Chadwick. Friday, February 5th. Derby Technical College. 7 p.m. "Industrial Furnace Design." Mr. E. W. Plumley.

Physical Society.—Friday, February 5th. Imperial College of Science, South Kensington, S.W. 4.45 p.m. Short papers.

Society of Engineers.—Monday, February 1st. Geological Society, Burlington House, W. 6 p.m. Presidential address, Mr. F. W. Mackenzie Skues.

Notes

Low-temperature Carbonisation

That in the carbonisation of coal at low temperature lies the solution of many of the difficulties of the electrical industry was an opinion expressed by Viscount Ednam in proposing "The Association" at the annual dinner of the Electrical Power Engineers' Association (West Midland Section) at Wolverhampton on January 22nd. He spoke of crude experiments in the carbonisation of coal which he had witnessed years ago in America, and said that the process had reached a stage at which it was really being placed on a commercial basis. He was confident of very great strides being made in the near future, which would result in cheaper electric power and light. Viscount Ednam said that the electrical industry had been handicapped by the depressed state of trade, but believed that there was every evidence of an advance towards a new era of industrial prosperity.

Responding, Mr. Ricketts (the president) laid stress upon the fact that the Association deplored strikes, and said that one of its most important duties was to settle disputes by arbitration. In its early days the Association had done much for the members by securing for them a decent wage, but at the same time it had helped the industry by insisting that members should make themselves thoroughly competent for their jobs.

Mr. A. Howell proposed the health of the visitors, and Councillor H. Bowdler, a member of the Wolverhampton Electricity Committee, replying, spoke of the advance made in the department under the guidance of Mr. T. A. Margary, the borough electrical engineer.

Arc-welding Rules

The British Corporation Register of Shipping and Aircraft, Glasgow, has compiled provisional rules for electric arc welding. Attention is drawn to the necessity for all welding to conform exactly to the conditions governing the acceptance tests, since uniform results cannot be secured if there be variations in the electrodes, current, or rate of deposition. Welders should be trained for the class of work in which they are engaged. Surveyors should check the methods of the operators as the work proceeds to satisfy themselves that the approved conditions are being observed. If the surveyors require fresh acceptance tests, such tests shall be made by the operator whose work is in question and under the conditions governing the work.

Faraday House Old Students' Association

The annual supper-dance of the Faraday House Old Students' Association and Faraday House Rugby Club will be held on February 5th at the Hotel Russell, Russell Square, W.C. Tickets (8s. 6d. single and 15s. double) can be obtained from the hon. secretary of the Association, Faraday House, Southampton Row, W.C.

The Electroplaters' and Depositors' Technical Society

The second annual dinner and dance of this Society is to be held this (Friday) evening at the Comedy Restaurant, Panton Street, W. Tickets (7s. 6d. each) can be obtained from the hon. secretary, Northampton Polytechnic Institute, St. John Street, E.C.1.

Inquiry into Colliery Explosion

An inquiry into the cause of the explosion at the Fife Coal Co.'s No. 1 Pit, Bowhill Colliery, Carpenden, when ten pit workers (including an electrician) lost their lives, was opened in Dunfermline Sheriff Court on January 21st. Mr. John Clark, colliery manager, said that the firemen were furnished with flame lamps for the detection of gas, as electric lamps gave no indication of its presence. He considered that flame-proof machinery was not necessary in the section concerned. He believed the ignition of the gas occurred at a point about eight feet to the right of an electrically driven fan, and that it was due to a damaged electric lamp and not to sparks from the switch box.

Mr. J. T. Kerr, electrician, said that the switch-box was damaged during the shifting of the fan, when the main cable developed two defective spots; the men therefore took the fan to the nearest point for a connection—the gate box of a coal cutter. It was not possible without switching on to tell the direction of rotation of the motor. An assistant electrician stated that he had never been instructed to make flame-proof joints.

Mr. H. T. Foster, Senior Inspector of Mines, Edinburgh, said that the man whose body was found nearest the motor must have been kneeling in the act of switching on and off, which required great effort. His impression was that the explosion had occurred within the gate-end box; the connecting up had been very roughly done, and the fan should have been scrapped years ago. Flame-proof apparatus should have been used in the section.

Capt. Platt (superintending officer, Ministry of Mines' testing station, Sheffield) thought that the filament of the broken electric head lamp, while still incandescent, had come into contact with the external atmosphere. It could have ignited fire-damp if present in sufficient quality. He held that miners' lamps should have stronger glass.

Mr. J. A. B. Horsley (Electrical Inspector of Mines) said that the gate-end box was not flame-proof, although designed to be so. Experiments showed that coal gas was ignited in the act of switching on the motor. He regarded a spark from the gate-end box switch as being the most likely cause of the ignition; there was an air space where the cable from the fan entered through which gas might have been passed and become ignited. The breaking of a lamp glass would not have inevitably caused an explosion, but a spark from the box would have done so.

The jury returned a formal verdict that the explosion was due to ignition of fire-damp and recommended that an auxiliary fan should be constantly in operation in the section, that the electrical apparatus should be flame-proof, and that the glass of all electric lamps used in mines should be of laminated or Triplex glass.

Household Electrical Appliances

Statistics are a necessarily preliminary for canvassing. We have in Great Britain no co-ordinated figures relating to the domestic load, but the following table from *Electrical Merchandising* gives a useful basis for an inquiry, as well as an indication of the state of development in the United States at the beginning of this year.

Appliance.	Wired Homes Owning.	Per Cent.	Wired Homes Without.
Clocks	3,350,000	16.4	17,091,000
Cookers	1,242,000	6.1	19,199,000
Dishwashers	114,000	0.6	20,227,000
Egg cookers	293,000	1.4	20,147,100
Floor machines	306,400	1.5	20,134,600
Heaters	3,339,080	16.3	17,101,920
Heating pads	2,236,800	10.9	18,204,200
Hot-plates	2,238,863	10.9	18,202,137
Ironers	735,990	3.5	19,715,000
Irons	19,772,325	96.7	668,675
Percolators	5,894,000	28.8	14,547,000
Ranges	1,095,000	5.3	19,346,000
Refrigerators	3,498,750	17.1	16,942,250
Sewing machines	3,350,000	16.4	17,091,000
Toasters	8,245,950	40.3	12,195,050
Vacuum cleaners	9,281,750	45.4	11,159,250
Waffle irons	2,735,000	13.4	17,706,000
Washing machines	8,356,250	40.8	12,084,750

Rapid X-ray Pictures

A new three-element X-ray tube and machine make possible the taking of a snapshot in less than one-thousandth of a second and enable physicians, for positive diagnosis, to see the inside of a human body without being blurred by the motion of the patient's muscles. This new instrument was shown for the first time at the recent convention of the Radiological Society of North America at St. Louis, and is the invention of Mr. Montford Morrison and Dr. C. T. Ulrey. An interesting feature of the apparatus is that it can be operated from an ordinary household lighting circuit, and in appearance it resembles a large wireless valve. The method of operating is somewhat similar to the collection of water behind a dam with electricity playing the part of the water. When the accumulated electricity is sufficient it sends the power suddenly through the tube and the fast picture is produced.

Progress in East Anglia

It is anticipated that the grid will be completed in East Anglia within three months. According to the *Daily Telegraph*, rapid progress has been made recently in this predominantly rural area. During the first year the consumption of electricity in East Anglia has increased by from 15 to 16 per cent.—the highest rate of increase in the country. Publicity campaigns have met with instantaneous success. In the district served by the East Anglian Electricity Supply Co. there were 884 consumers in 1927; now there are 5,400, and the number is increasing by 500 a month. In many villages 80 per cent. of the houses are electrified, and electricity is being used for cooking and heating, incubation, milking, threshing, and other power purposes.

Our Service Department

Inquiries must be accompanied by a stamped addressed envelope.

We shall be glad to learn the names and addresses of the makers of the following:—

LUMSDEN sunray lamp.
HOMEFYRE electric bowl fire.
VALET VAC vacuum cleaner.
Dry cells of the air depolarised type.
ZOIS switches.
Switchgear bearing the monogram RNB.

Our Personal Column

Electrical men are invited to enable us to keep readers of the "Electrical Review" posted concerning their movements

Mr. L. H. Crowther has been appointed electrical engineer to the English Steel Corporation, Ltd. Mr. Crowther, who is deputy chairman of the Sheffield Sub-Centre of the Institution of Electrical Engineers, was formerly associated with Cammell Laird & Co., Ltd., as chief assistant electrical engineer.

Mr. W. E. Jones, who has been appointed borough electrical engineer of Basingstoke

Mr. W. E. Jones, whose appointment as borough electrical engineer to Basingstoke Corporation was announced in our last issue, received his education at Chaloner's Foundation School, North Devon. He was a premium pupil to Mr. Swarbrick, engineer and manager of the Minehead Electric Supply Co., and received further practical training with the South London Electric Supply Corporation, Ltd., and technical training at the Borough Polytechnic. Subsequently he held staff appointments with the South London Electric Supply Corporation, the Hong-Kong Electric Co., South China, Wolverhampton Corporation, and the West Midlands Joint Electricity Authority. He was appointed chief assistant engineer to Basingstoke Corporation Electricity Department in 1929, and was promoted to acting borough electrical engineer in July last. Mr. Jones is 34 years of age.

The Parliamentary and General Purposes Committee of St. Pancras Borough Council has recommended that **Mr. J. E. Coode** be appointed chief clerk of the Electricity and Public Lighting Department as from April 1st next, at a commencing salary of £400 per annum, in succession to **Mr. A. E. Pycraft,** who, as announced in our issue of December 18th, p. 935, is retiring on March 31st.

At the annual meeting of the Radio Manufacturers' Association held on January 21st **Lt.-Col. J. T. C. Moore-Brabazon** was re-elected president, and **Capt. Ian Fraser, Sir Hugo Hirst, the Marchese Marconi, Maj.-Gen. Sir Philip Nash,** and **Messrs. S. R. Mullard, N. M. Pease, J. T. Mould,** and **A. E. Bowyer-Lowe** were re-elected vice-presidents, together with **Mr. R. Millward-Ellis,** the Association's past-chairman.

Mr. J. Carter, managing director of Crossley Bros., Ltd., has been elected to serve on the Council of the British Engineers' Association for the ensuing year.

Sir Douglas Newton and **Sir Alexander Roger** have been elected Companions of the Institution of Electrical Engineers.

Sir Andrew Duncan, Chairman of the Central Electricity Board, sailed on January 21st for Halifax, and he expects to be away for about four weeks. The object of his visit to Nova Scotia will interest electrical men. In 1925 Sir Andrew was chairman of a Royal Commission which was set up to investigate and report on the coal industry there, and, as the result of the work of the Commission over which he presided, strife and bad conditions gave way to prosperity in the industry. Unfortunately, further trouble has now developed, and the Dominion Government has made representations to the Home Government which made Sir Andrew's present visit desirable. While in Canada he will take the opportunity of conferring with electricity supply authorities there.

[Elliott & Fry.

Sir Alexander Roger, one of the new Companions of the I.E.E.

Lady Gray has been elected president of the Hartlepools and District branch of the Electrical Association for Women.

Mr. Bertram Wood, chief engineer of the Rhodesia Broken Hill Development Co., Ltd., has arrived in London on four months' leave.

Major R. W. Klitz, M.I.E.E., has been appointed by the Northern Ireland Electricity Supply Board to take charge of sales and organisation.

Prof. C. T. R. Wilson, F.R.S., Professor of Natural Philosophy, Cambridge University, has been awarded the Duddell Medal for 1931 by the Council of the Physical Society.

Mr. T. O. Callender was recently appointed to the board of Callender's Cable and Construction Co., Ltd. He is the son of Sir T. O. Callender, the deputy chairman and managing director of the company, and therefore grandson of the founder of Callender's. He was born at Erith, Kent, in 1896, and was educated at St. John's College, Cambridge. In the Great War he joined the Royal Marines, and served mainly in France with the 1st Battalion R.M.L.I. During the last year he served in the Orkney Islands with the Royal Marine Submarine Miners. In 1920 he joined Callender's and passed through all departments of the Erith works, and was engaged on outside contracts at home and abroad. He was appointed manager of the Marine Department in September, 1928, and in November, 1930, he was made advisory director to the board. He was appointed director on January 1st.

[Lafayette

Mr. T. O. Callender, who has been appointed a director of Callender's

It was announced at the meeting of the Institution of Electrical Engineers on January 21st that the Faraday Medal had been awarded to **Sir Oliver Lodge.**

Obituary

Sir Alfred Yarrow.—We regret to learn of the death, at the age of 90, of Sir Alfred Yarrow, Bt., founder of Messrs. Yarrow and Co., shipbuilders and boilermakers. When 18 years of age, he and a friend received inspiration from lectures given by Faraday, and they constructed what Sir Alfred claimed was the first private overhead telegraph in England. He was responsible for many inventions, his greatest, of course, being the Yarrow water-tube boiler. He began shipbuilding at the Isle of Dogs when he was 23 and forty years later moved the business of Yarrow & Co. to the Clyde. He gave up the presidency of Yarrow & Co. in 1927, having retired, as chairman, some years before. Sir Alfred, who was created a baronet in 1916, was a Fellow of the Royal Society. He is succeeded by his eldest son, Mr. H. E. Yarrow, who is the present chairman of Yarrow & Co.

Mr. S. F. Groome.—The death occurred on January 10th of Mr. Septimus F. Groome, the senior member of the staff of W. H. Allen, Sons & Co., Ltd., of Bedford. He joined the company when in business in London about 50 years ago as a designer of electrical machinery.

Mr. L. Brennan.—Mr. Louis Brennan, C.B., passed away very suddenly in Switzerland on January 17th, at the age of 79 years. He will be remembered by our readers through his experimental work on monorail locomotives, in which the gyroscopic principle was employed.

Mr. H. W. Jarvis.—The death is reported of Mr. Horace William Jarvis, of the firm of Jarvis Brothers, electrical engineers, Middlesbrough, at San Fernando, Trinidad, aged 68. He was formerly with the North-Eastern Steel Co., and joined Jarvis Brothers in 1888. At the time of his death he was in Trinidad for the benefit of his health.

Mr. E. P. Austin.—The death is reported of Mr. Edgar P. Austin, electrical engineer to the Sheepbridge Coal and Iron Co., at Chesterfield, at the age of 49. He was formerly deputy electrical engineer and tramway manager to the Chester Corporation, and an instructor in electricity at Chesterfield Technical College.

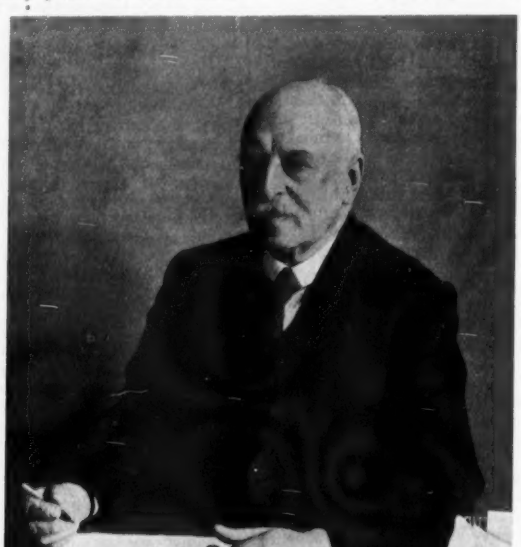
Mr. J. Wood.—The death has occurred at Colwyn Bay of Mr. James Wood, who was for many years assistant manager of the Manchester Corporation Tramways. During the War he acted as manager of that undertaking. He had been living in retirement during the last six years.

Will.—Mr. J. H. Armstrong, chairman of the Newcastle-upon-Tyne Electric Supply Co., Ltd., deputy-chairman of the Tyneside Tramways and Tramroads Co., and a director of a number of electricity supply companies, left £33,424 (net personalty £19,252).

W. M. Mordey, Hon. M.I.E.E.

IN conferring the Honorary Membership of the Institution of Electrical Engineers on Mr. William Morris Mordey last week, the Council fittingly recognised the debt owed by the members of the profession to an electrical pioneer. We have pleasure in tendering our cordial congratulations.

Mr. Mordey, who is in his seventy-sixth year, has been a member of the Institution since 1889; he joined as an Associate as long ago as 1881. For many years he was a member of the Council, and was elected President in 1908-09. Mr. Mordey has had an unusually wide experience in both the "light" and "heavy" sides of electrical engineering.



Mr. W. M. Mordey

At the age of fourteen he entered the Postal Telegraph Service. He devoted all the time he could spare from his duties to the study of electricity, and so clear was the grasp he quickly obtained of fundamental principles—entirely by self-tuition—that he was able to conduct classes of his fellow employés in electricity and magnetism and in telegraphy in connection with the City and Guilds Technical Institute.

In 1881 he became superintendent of the testing department of the Brush Electrical Engineering Co. in London. He turned his attention to dynamo design, and his investigations led to the construction of the "Victoria" dynamo. In those days d.c. machines presented more scope for useful work than did a.c. machines, for, as Mr. Mordey himself pointed out in articles which he contributed to the ELECTRICAL REVIEW on the occasion of our twenty-fifth year of publication (November 12th, 1897), it was not until the commercial development of the transformer and the need to cover wider areas than those formerly dealt with that a.c.—though older than d.c.—came to be widely adopted.

His first paper before the Institution (then the Society of Telegraph Engineers and Electricians) was read in 1884, the subject being "Prejudicial Actions in Dynamo Machines."

Early in 1886 he upset many ideas then prevailing in regard to electric motors in a much-discussed contribution to the *Philosophical Magazine*, "The Dynamo as a Generator and as a Motor," and in 1887 he designed his well-remembered alternator, which, with his transformers and other apparatus, was developed by the Brush Company under the name of the "Mordey-Victoria alternating-current system," and was installed in some sixty towns at home and abroad.

As a result of his experience in this work, he read, in 1889, a notable paper before the I.E.E. on "Alternating-Current Working," for which he was awarded the Institution Premium. He followed this up with two papers on the same subject in 1893 and 1894. Meanwhile, Mr. Mordey still maintained his interest in "light-current" matters. In 1883 he read a paper before the I.E.E., describing his experiments on resistance of metals, proving that in a finely divided state they had a negative temperature coefficient, and that their differentiation from carbon on this ground was invalid.

A paper on "Capacity in A.C. Working" read before the I.E.E. in 1901 had a very mixed reception, for it drew attention to the fact that in a.c. cables the loss from dielectric hysteresis in the insulating material might be very serious. This paper first drew attention to a matter which was afterwards recognised to be of great importance.

In 1902, jointly with Mr. Bernard M. Jenkin, he read an important paper before the Institution of Civil Engineers on "Electric Traction on Railways," which was discussed at five meetings of the Institution, and was awarded two gold medals.

His most remarkable discovery of recent years was the "Mordey effect," which formed the subject of a discourse before the Royal Institution in 1923. He showed that small particles of magnetic metals and non-conducting magnetic minerals were powerfully repelled in a.c. fields, due entirely to magnetic hysteresis. This discovery is being put to practical use in the Mordey mineral separator and in other ways.

He has read papers, in addition to those referred to above, before the Royal Society, the British Association, the Physical Society, the South African Institute of Electrical Engineers, and other institutions.

He is a member of the Alpine Club and has found recreation in mountaineering abroad, and still enjoys long walks at home. He has a fine bass voice and sings in the Bach Choir.

We may close this brief account of Mr. Mordey's career up to the present time with a reference to his valuable gift, in 1915, to the library of the Institution of Electrical Engineers in the form of a "commonplace book" of Michael Faraday's (1809-1810) in the latter's clear handwriting and with his illustrations. The flyleaf bears the inscription: "Jane Barnard to William Mordey, Esq." Jane Barnard was Faraday's niece.

Financial Section

New Companies, Returns of Share Capital, Debenture Charges, Reports of Electrical Companies, Dividend Changes, Transactions in Stocks and Shares

New Companies Registered

Relay Services Association, Ltd.—Public company. Registered January 12th. Capital, £500 in 5s. shares. Objects: To acquire the business carried on by H. Thornton and others at Burnley, as "Wireless Relay Services Association." The directors are: O. B. Kellett, 11, Allerton Road, Southport, and H. Noble, 1, Sunnyside, Baildon, near Shipley. Solicitors: Baron & Ingham, County Bank Chambers, Padiham.

Bacon & Jones, Ltd.—Private company. Registered January 8th. Capital £100 in £1 shares. Objects:—To carry on the business of manufacturers of and dealers in dynamos, motors, armatures, magnetos, batteries, conductors, insulators, transformers, and electrical plant generally, &c. The first directors are:—L. Bacon, 19, Robin Hood Crescent, Hall Green, Birmingham; and W. Jones, 25, Newcombe Road, Handsworth, Birmingham. Registered office: 63, Barwick Street, Birmingham.

Acceptors, Ltd.—Private company. Registered January 20th. Capital £100 in £1 shares. Objects:—To carry on the business of manufacturers, importers and exporters of, agents for and dealers in radio apparatus, cabinets, valves, television sets, &c. The permanent directors are:—R. Summers, 342, High Road, Leyton, E.10; and F. Edwards, 4, Moyers Road, Leyton, E.10. (both directors of World's Radio (Scotland), Ltd. Registered office: 6, White Horse Street, Leeds.

Electrical and Radio Distributors, Ltd.—Private company. Registered January 20th. Capital £1,000 in £1 shares. Objects:—To carry on the business of radio, sound and television apparatus manufacturers and dealers, electricians, &c. The directors are:—L. Sobel and Mrs. Esther Sobel, both of 35, Bethune Road, Stoke Newington, N. Registered office: 32/4, Red Lion Street, Holborn, W.C.

Hubbard & Williams, Ltd.—Private company. Registered January 19th. Capital £1,000 in £1 shares. Objects:—To carry on the business of electrical, wireless, mechanical and general engineers, wiring and general contractors, &c. The directors are:—T. P. Hubbard, 10, Leybourne Street, Higher Broughton, Salford; and H. W. Williams, 138, Droylsden Road, Newton Heath, Manchester.

William Lawson.—Private company. Registered January 20th. Capital £1,000 in £1 shares. Objects:—To carry on the business of manufacturers and retailers of radio goods and accessories, &c. The first directors are:—W. C. H. E. Lawson (managing director) and Mrs. E. E. Lawson, both of 39, Barnfield Avenue, Shirley, Croydon. Registered office: High Street, Beckenham.

Returns of Electrical Companies

Carter & Co. (Nelton), Ltd.—Satisfaction in full on May 8th, 1931, of mortgage dated April 24th, 1925, and registered May 2nd, 1925. (According to the register of mortgages, the mortgage registered May 2nd, 1925, originally secured £650 and further advances.)

Community Radio (1928), Ltd.—Mortgage for £480 dated December 5th, 1927, charged on bungalow, house and workshop in Kiln House Lane, Lytham St. Anne's (being property acquired by the company on November 23rd, 1931). Registered pursuant to Section 81 of Companies Act, 1929. Mortgagees: Huddersfield Building Society.

Electric Motor Supplies, Ltd. (in voluntary liquidation).—Satisfaction in full on December 30th, 1921, of mortgage in favour of Lloyds Bank Ltd., dated August 30th, 1928, and registered August 31st, 1928. (According to the register of mortgages, the mortgage registered August 31st, 1928, originally secured all moneys due or to become due not exceeding £2,000).

Cleartron (1927), Ltd.—D. L. Honeyman, 9, Basinghall Street, E.C.2, ceased to act as receiver on January 11th.

Switchgear & Cowans, Ltd.—Satisfaction to the extent of £11,000 on December 31st, 1931, of debentures authorised February 13th, 1920, and registered February 27th, 1920. (According to the register of mortgages, the debentures registered February 27th, 1920, originally secured £18,000.)

H. A. Lee, Ltd.—Capital £1,500 in £1 shares. Return dated October 17th, 1931. 1,350 shares taken up. £550 paid. £800 considered as paid. Mortgages and charges: Nil.

Wenham Lighting Corporation, Ltd.—Capital £1,000 in £1 shares. Return dated August 13th (filed December 16th, 1931). All shares taken up. £1,000 paid. Mortgages and charges: Nil.

W. R. Sykes Interlocking Signal Co., Ltd.—Capital £37,550 19s. in 46,175 "A" shares of 10s. and 41,327 "A" shares of 7s. each. Return dated November 4th, 1931. 41,327 7s. "A" shares taken up. £7,232 4s. 6d. paid (3s. 6d. per share). £7,232 4s. 6d. considered as paid (3s. 6d. per share). Mortgages and charges: £6,189.

Loewe Radio Co., Ltd.—Capital £100 in £1 shares. Return dated September 4th, 1931. 50 shares taken up. £50 paid. Mortgages and charges: Nil. A return of allotments, made up to November 12th, 1931, shows a further 10 shares allotted, payable in cash, and fully called up.

E. Mercer, Ltd.—Capital £2,000 in £1 shares. Return dated October 2nd, 1931. 1,502 shares taken up. £2 paid. £1,500 considered as paid. Mortgages and charges: Nil.

Oxford Radio Supplies, Ltd.—Capital £1,500 in £1 shares. Return dated September 16th, 1931. 1,400 shares taken up. £1,400 paid. Mortgages and charges: Nil.

Universal Gramophone & Radio Co., Ltd.—D. E. R. Matthews, 21, Bedford Row, W.C.1, was appointed receiver and manager by Order of Court dated November 5th, 1931, in place of F. Albrecht, discharged.

George Thompson (Leeds), Ltd.—Mortgage dated December 31st, 1931, to secure £1,000, charged on land, shops, &c., at Pannal, Yorks. Holder: E. Thompson, 41, The Drive, Roundhay, Leeds.

Rochdale Community Radio, Ltd.—Debenture dated December 31st, 1931, to secure £1,000, charged on real and leasehold property and company's other assets and property. Holder: J. W. C. Robinson, 176, St. George's Road, Hull.

Dickinson Electrical Manufacturing Co., Ltd.—Equitable second charge on freehold factory, buildings and lane adjoining at Graham Road, Bexley Heath, dated January 6th, to secure all moneys due or to become due from the company to Martins Bank, Ltd

City Notes

The Melbourne Supply Co., Ltd.—Presiding at the recent annual meeting, Mr. J. Seymour Teulon, deputy chairman, said that the unprecedented rise in the rates of exchange raised the question whether on payments of dividends to shareholders overseas the burden of exchange should be borne by the company or by the shareholders individually. On the advice of eminent counsel the company had decided that the payments were payable in Australian currency and therefore individual shareholders abroad would have to accept the reduction in dividend involved on the transference of the money to London. The directors realised that a judicial determination might reasonably be sought, and they would facilitate the hearing of any proceedings. So far, however, no attempt to challenge the action of the company had been made. He criticised the manner in which the Victorian Government had carried out its obligations to the company in the purchase of the undertaking by the State Electricity Commission.

The Singapore Traction Co., Ltd., reports a profit for the year ended September 30th last of £51,134 (as against £57,944), to which is added £3,725 brought in, making £54,859. After appropriating £4,864 for debenture stock redemption and £18,000 for depreciation and renewals, it is proposed to pay a dividend of 7 per cent. (against 8 per cent.) on the 7 per cent. cumulative preference shares, on account of arrears, which carries with it the payment of a like sum (£14,000) to the managers, leaving £3,995. The arrears of dividend on the preference shares will then remain at 10 per cent. The total length of line open for traffic at the end of the year was 24.84 miles. As compared with the preceding year the number of vehicle-miles run increased by 9 per cent., but there were decreases of 4.8 per cent. in the number of passengers carried, and 2.6 per cent. in passenger receipts. A marked falling-off in traffic receipts and operating profits set in about a year ago, and still continues.

The Montreal Light, Heat and Power Co., in its annual statement for the year ended December last, shows a net income of $9,767,000, equivalent to 217 cents for each share outstanding. This compares with a net income of $8,943,000 for the previous year, which was equivalent to 219 cents per share. The gross revenue during the year was $25,410,000, an increase of approximately $2,000,000 as compared with 1930. $2,460.000 was transferred to capital and surplus account, and $700,000 to contingent reserve.—*Reuter* (Montreal).

J. & E. Hall, Ltd., report a net profit for the year ended September 30th last of £21,843, to which is added £3,469 brought in and £9,500 transferred from reserve, making £34,812. The dividend on the ordinary shares is 4 per cent. (against 5 per cent.), and £3,412 is carried forward.

The Western Union Telegraph Co. reports a gross revenue for 1931 of $110,616,210, as compared with $133,235.751 in 1930. Total expenses amounted to $99,003,346 ($118,941,140), leaving a balance of $11,612,864, and after providing for bond interest there is a net income of $6,255,549, as compared with $9,247,032.

Companies Struck Off the Register.—The names of the undermentioned companies have been struck off the Register and they are thereby dissolved:—

Electrical Precipitation Co., Ltd.
Electro Alloys, Ltd.

The Brazilian Traction, Light & Power Co. reports net earnings of $20,910,417 for 1931, as compared with $27,549,594 in the preceding year.

Overseas Communications of South Africa, Ltd.—At the recent annual meeting the chairman, Sir Drummond Chaplin, said that at present the company's receipts were keeping up well, but it had to face the prospect of losing traffic connected with Rhodesia when the direct services now being organised between Southern Rhodesia and England came into operation in a few months. For the past financial year the company made a profit of £41,034, out of which a final dividend of 7½ per cent. (making 15 per cent. for the year) is being paid, with a bonus of 2½ per cent., and £10,000 is transferred to the reserve fund.

Imperial & International Communications, Ltd., reports that the estimated traffic receipts for December were £451,831, as compared with £436,407 in December, 1930. The receipts for the twelve months ended December 31st last were £4,839,437, as compared with £5,365,561 for 1930, a decrease of £526,124. Each of the first nine months showed a fall in receipts, as compared with the corresponding month of the preceding year, but in the last three months there were increases. In comparing aggregates, allowance must be made for the changed conditions of sharing traffic.

Thomas De La Rue & Co., Ltd., are holding an extraordinary meeting on February 11th, when resolutions will be submitted for the reduction of the capital of the company from £1,376,000 to £1,012,016 by writing off 12s. from each of the 606,640 issued £1 shares. The shares, as reduced, will then be consolidated into £1 shares.

Allen West & Co. announce that they have decided to defer payment of the interim dividend for the half-year on the 7 per cent. cumulative participating preference shares.

The Anglo-Argentine Tramways Co., Ltd.—At an extraordinary meeting held on January 25th, a resolution was passed approving alterations in the articles of association necessitated by a moratorium granted by the 5 per cent. debenture stockholders. The Duke of Atholl (chairman), who presided, said that they appeared to be on the point of obtaining a settlement with the Buenos Aires authorities on the questions of tariff increases, fare adjustments, and the restriction of unfair competition.

Stocks and Shares

TUESDAY EVENING.

THIS is the week, of course, in which the greatly anticipated Lausanne Conference was to have been held, a Conference at which, according to hopeful anticipation, the members would have recommended either a complete cancellation of War debts, or else such a moratorium as would have amounted to practically the same thing as a wiping clean of the slate. The developments which arose, and which led to the postponement of the War debts consideration until some later date, had the effect of causing a disappointment which had singularly little influence over Stock Exchange markets. Prices had been good in advance of the Conference, but the delay in connection with the affair failed to act as a damper to the optimism previously displayed. British Government stocks, and the circles which revolve around them, are holding their improved prices in a way which demonstrates the presence of buyers prepared to take whatever stock comes cheaply to market.

The Bull Points

The international situation is viewed without concern. At home, the prospect of Parliament's reopening is, for once in a way, welcome, seeing that it may on this occasion lead to definite legislation in the direction of further safeguarding measures. The latter consideration is helping, to a small extent, the prices of shares in the iron and steel industry. In other industrial markets, confidence continues to be maintained in the impression that the country's trade has turned a corner in the long lane of depression, and that, gradual as recovery may be, it will be none the less sure on that account. The Stock Exchange has removed all restrictions upon business facilities in the House. This is taken as indicating the Treasury's conviction that matters are settling down in satisfactory fashion.

Home Electricity Supply

Dealers in the market for home electricity supply shares report that allottees of new shares in those electricity supply undertakings which are partially capitalising reserves, and distributing the new shares by way of bonus to the holders, seem to prefer to take up their shares, without showing any disposition to add to them. On the other hand, there is very little selling. The net result, therefore, is that business in the new shares runs on exceedingly quiet lines, and the distribution of the new shares has brought in considerably less business than it usually does on such occasions. The new Metropolitans are 37s. 6d., a rise of 6d. on the week. Westminster new ordinary are 1s. higher at 25s. 6d. bid. Amongst the old ordinary, County of London at 44s. 6d. are 9d. up, while St. James' & Pall Mall, at 28s. 6d., are 6d. down on the week. The debenture stocks of the electricity authorities hold the rises that they achieved last week.

Gilt-edged Stocks

The London General Omnibus Company announces that a further £100,000 new 5 per cent. cumulative income debenture stock has been placed privately. This brings the total amount thus placed up to £650,000 stock, and leaves £100.000 still in reserve. Stock can be bought in the market at 95½ free of stamp. Amongst other gilt-edged stocks on offer in the market, it may be of service to mention that £500 British Electric Traction 4½ per cent. second debenture can be obtained at 83. This pays £5 8s. 3d. per cent. on the money. Interest is due on the 1st May and 1st November; and, to cover the £13,696 required for the annual service of the interest, there was avail-

able, on the last-published accounts, £284,000 to meet it. The stock is redeemable at any time at 105, and may be regarded as a gilt-edged security. Another stock which is exceedingly well covered, and of which £2,500 can be bought at 91, is South London Electric 4½ per cent. debenture. The immediate yield is the modest one of £4 18s. 9d. per cent., raised to a shade over 5 per cent. on the money by allowing for redemption at 100 in 1972. The stock can be paid off at any time after 1965 at par. The interest requires £13,500 per annum. The company earned £95,900 in the last yearly period.

Home Railway Stocks

On the Thursday in this week is due the announcement of the first important Home Railway dividends in respect of the final six months of 1931. The Metropolitan reduced its interim dividend by a half per cent., and is expected to pay 2 per cent. to make 3 per cent. for the whole year, as against 3½ per cent. for 1930. The declaration is awaited with a good deal of curiosity, in that it may provide a pointer to what may be expected from the steam companies, and also, of course, from the Underground group. Districts and London Electric Railway ordinary stocks are a point lower at 58½. The Underground's proposal for a cut in wages is under discussion between the company, the Electrical Trades Union, and other craft unions; the matter is being debated amicably on both sides. Amongst the prior-charge stocks, a better tendency has developed. Central London 4 per cent. debenture is up two points to 75½, and Metropolitan District 6 per cent. debenture strengthened to 111½. The prospect of a decline this week in Bank Rate was considered to be promising.

Cables and Wireless

The figures are now available of the 1931 traffics secured by Imperial and International Communications. For the twelve months the total is £4,839,000, which goes against £5,365,000. It has to be added, however, that the apparent decline of £526,000 must not be accepted as exact, adjustments having been made in the manner of presenting the traffics which preclude their precise comparison. The December figures were well above those for the previous month, and, with the exception of October, are the best obtained in any one month during 1931. The showing is regarded as none too hopeful for those who profess to expect payment of a full year's preference dividend next March from the Cables & Wireless combine, though it is thought that the earnings will be regarded as sufficient to justify payment of part of the full 5½ per cent. which will then become due to the stockholders. Prices of the stocks were not affected by the publication of the figures.

Telephone Prices

Marconi Marines have sagged to 31s. 3d. Anglo-American preferred stock at 90 is 2 points down, and the deferred stock is a point lower at 21. The principal movement in the group is a rise of 50s. in Great Northern Telegraphs to 21½. The Globe shares, ordinary and preference alike, continue heavy. American Telephone & Telegraph Common shares have gone back to 170; International Telephones keep at 14, International Automatics at 28s. and the "B" deferred at 27s. 6d.

Ericsson Telephones 7 per cent. preference have hardly moved for several weeks past from the present price of 20s. Hall's Telephone Accessories are quoted at 16s. Chloride Electrical Storage "A" and "B" shares stand at the common figure of 2½. Telephone Manufacturing (1929) are half a crown, and Telephone Rentals 3s. 9d.

Latin-Canadians

The tendency of American-Canadian dollar stocks is a trifle heavy, the exception being Brazilian Traction common shares, which have risen to 16¾, showing a gain of 1½. The company is paying dividends of 25 cents. per quarter, and, with the less timid tone now apparent in regard to Brazilian affairs generally, the speculator is inclined to select Brazilian Tractions as a popular international stock, with chances of capital appreciation.

Power Corporation of Canada shares at 30 have lost 2¾ of the 4 points which they gained last week. Shawinigans remained at 34, Barcelona Tractions 6½ per cent. bonds fell back to 67½. There has been a little inquiry for some of the sterling bonds of the Brazilian tramway companies.

Of the sterling stocks, Anglo-Argentine Tramways 5 per cent. debenture rose 2 to 14½, on the passing by the shareholders of a resolution approving alterations in the Articles of Association, rendered necessary by the moratorium granted by the holders of the 5 per cent. debenture stock. The Duke of Atholl, who was in the chair, spoke hopefully of the chances of a settlement between the company and the authorities of Buenos Aires, who officially admitted nine months ago the justice of the company's demands, but who had taken no action towards the settlement of the points in dispute.

Manufacturing and Equipment Shares

British Insulated ordinary have strengthened to 53s. 9d. Telegraph Constructions are £1 lower at 11. The group of manufacturing and equipment companies is very steady, though the amount of business passing in the market is of meagre volume. Babcock and Wilcox weakened to 43s. 9d., but Vickers responded to "tariff-talk" and advanced to 8s. 10½d. The rubber market has taken a leaf from the international politician's book, and come to a standstill agreement.

Share List of Electrical Companies

Home Electricity Companies

	Nom.	Approx. Dividend. 1929.	1930.	Price, Jan. 26, 1931.	Rise or Fall.	Yield p.a. £ s. d.
Bournemouth and Poole		15	15	57/6	—	5 4 4
Brompton Ordinary		8½	8½	27/6	—	5 1 0
Central Electricity 4½% Deb.	Stock	—	4½	87	—	5 3 6
Charing Cross Ordinary	1	8½	8½	27/6	—	5 1 10
Chelsea	1	8½	8½	26/-	—	5 7 8
City of London	1	10	10	33/9	—	5 17 10
Clyde Valley	1	8	8	31/3	—	5 2 5
County of London	1	11	11	44/6	+9d.	4 18 10
Edmundsons' 7% Pref.	1	7	7	28/6	—	5 19 2
Elec. Supply Corporation	1	11	11	41/3	—	5 6 6
Kensington Ordinary	1	8	8	29/-	—	4 16 7
Lancs. Light and Power	1	7	6½	24/6	—	5 6 0
London & Home Counties 4½% Deb.	Stock	—	4½	87	—	5 3 6
London Electric	1	8½	9	33/-	—	5 9 1
Metropolitan	1	9	10	38/9	—	5 3 3
Midland Counties	1	6½	7	26/3	—	5 8 3
Mid. Elec. Power	1	15	8	28/9	—	5 11 4
Newcastle-on-Tyne Ordinary	1	6	6	23/3	—	5 3 3
Do. 7% Pref.	1	7	7	26/-	—	5 7 8
Notting Hill 6% Pref.	10	6	6	10½	—	5 14 3
North Met. Elec. 6% Pref.	1	6	6	22/6	—	5 6 8
St. James' and Pall Mall	1	8	8	28/6	−6d.	4 18 3
Scottish Power	1	8	8	26/3	—	6 2 0
South London	1	8½	8½	25/6	—	5 9 8
Urban Ordinary	1	7	7	27/-	—	5 3 8
Westminster Ordinary	1	8½	8½	25/6	—	5 9 10
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	21/-	+6d.	7 2 10
Yorkshire Elec.	1	8	8	30/9	—	5 4 1

Home Rails

Central London Ord. Assented	Stock	4	4	67½	—	5 18 0
Metropolitan	,,	4	3½	38½	—	9 1 10
Do. District	,,	5	5	58½	−1	8 11 0
Underground Electric	1	8	8	19/-	—	8 8 6

Telegraphs and Telephones

Anglo-Am. Tel. Pref.	Stock	6	6	90	−2	6 13 4
Do. Def.	,,	1½	1½	21	−1	6 19 6
Cables & Wireless 5½% Pref.	Stock	5½	5½	48½	—	—
Do. A 7½% Ord.	,,	Nil	—	18	—	—
Do. B Ord.	,,	Nil	—	11	—	—
Globe Tel. and T. Ord.	10	10	8½	7	—	—
Do. do. Pref.	10	6	6	7	—	8 11 6
Great Northern Tel.	10	20	20	21½	+2	9 6 0
Marconi-Marine	1	15	15	31/3	−1/3	9 12 0
Oriental Telephone Ord.	1	12	12	2 1/3	—	*5 16 0

Home and Foreign Trams, etc.

Anglo-Arg. Trams First Pref.	5	5½	—	6/3	—	—
Do. do. 2nd Pref.	5	6	—	3/9	−¼	—
Do. do. 5% Deb.	Stock	5	5	14½	+2	—
British Electric Traction Def. Ord.	,,	5	5	720	—	—
Do. do. Pref. Ord.	,,	8	8	110	—	7 5 6
Brazil Traction	100	8	—	16¾	+1¼	5 19 5
Brit. Columbia Elec. Rly. Pcs.	Stock	5	5	81	−2¼	6 3 5
London & Sub. Trac. 5% Pref.	1	Nil	Nil	8/3	—	—
London United Tram Deb.	Stock	4	4	55½	—	7 4 2
Mexico Trams, 5% Bonds	—	5	5	32½	—	15 7 8
Mexican Light Common	100	Nil	Nil	20	+5	—
Do. 7% Pref.	100	7	7	30	+5	23 6 9
Do. 1st Bonds	—	5	5	60½	—	8 5 4
Victoria Falls Ord.	1	15	15	55/-	—	5 9 1
Yorkshire (West Riding)	1	Nil	Nil	6/3	—	—

Manufacturing Companies

Assoc. Elec. Ord.	1	6	6	1 1/3	—	5 15 8
Do. Pref.	1	8	8	28/3	—	6 2 0
Babcock & Wilcox	1	15	14	43/9	−½	*8 9 0
British Aluminium Ord.	1	10	10	23/9	—	8 8 5
British Insulated Ord.	1	15	15	2½	+¼	5 11 7
Brush Ord.	Stock	10	5	60	—	8 6 8
Callender's	1	15	15	2 1/3	—	6 3 1
Do. 6½% Pref.	1	6½	6½	22/6	—	5 15 5
Crompton Parkinson Ord.	5/-	30	30	18/9	—	8 0 0
Do. 8% Pref.	1	8	8	26/3	—	6 2 3
Edison-Swan 1st Pref.	1	7½	7½	23/3	—	6 9 0
Do. 5% Deb.	Stock	5	5	89½	—	5 11 10
Electric Construction	1	5	Nil	7/6	—	—
Enfield Cable Ord.	1	25	25	3½	—	6 8 10
English Electric	1	Nil	Nil	7/6	—	—
Do. do. Pref.	1	Nil	Nil	7/6	—	—
Ferranti Pref.	1	7	7	20/9	—	6 15 0
G.E.C. Pref.	1	6½	6½	23/-	—	5 13 1
Do. Ord.	1	14	10	42/-	—	4 15 3
Henley's	1	30	30	4½	—	6 3 1
Do. 4½% Pref.	5	4½	4½	4½	—	5 0 1
India-Rubber	1	Nil	Nil	5/9	−6d.	—
Johnson & Phillips	1	10	10	23/9	—	8 8 8
Siemens Ord.	1	7½	7½	21/3	—	7 1 2
Telegraph Construction	12	10	7½	11	−1	8 3 8

* Dividends paid free of Income Tax.

Published Specifications

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parentheses are those under which the specifications will be printed and abridged, and all subsequent proceedings will be taken.

1930.

21,566. "Mercury arc rectifiers." British Thomson-Houston Co., Ltd., and F. P. Whitaker. July 16th, 1930. (363,984.)
22,373. "High potential transformers for Rontgen installations." Koch & Sterzel Akt.-Ges. July 25th, 1929. (364,133.)
22,497. "Electric rare gas illuminating lamps." A. Lederer. July 30th, 1929. (364,088.)
24,707. "Thermionic cathodes of vacuum electric tube devices." E. Y. Robinson, F. Barton, and Associated Electrical Industries, Ltd. August 18th, 1930. (364,136.)
25,068. "Picture assembling devices for television and picture transmission." Telehor Akt.-Ges. August 5th, 1930. (364,003.)
25,456. "Photo-electric apparatus." British Thomson-Houston Co., Ltd. August 28th, 1929. (364,006.)
25,588. "Communication cables of high line attenuation." Siemens-Schuckertwerke Akt.-Ges. February 14th, 1930. (364,008.)
26,178. "Electro-magnetic relay arrangement for indicating temperature." Allmanna Svenska Elektriska Aktiebolaget. September 2nd, 1929. (364,140.)
26,458. "Apparatus employing resonant circuits for interaction between train and track." L. Mellersh-Jackson (Vereinigte Eisenbahn-Signalwerke Ges.). September 23rd, 1930. (364,016.)
26,468. "Electron discharge devices such as electric rectifying tubes and the like." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. January 18th, 1930. (364,093.)
26,633. "Electric motor control systems." E. M. Johnson and Associated Electrical Industries, Ltd. September 24th, 1930. (363,996.)
26,721. "Electric power transmission systems." Westinghouse Electric & Manufacturing Co. October 30th, 1929. (364,021.)
26,731. "Electrical discharge tubes for use in the recording of sound." Fidelity Films, Ltd., and F. K. Crowther. September 25th, 1930. (364,146.)
26,835. "Rotors for high speed machines." Akt.-Ges. Brown, Boveri et Cie. November 2nd, 1929. (364,027.)
26,918. "Electric circuit breakers." British Thomson-Houston Co., Ltd. September 26th, 1929. (364,031.)
26,921. "Vacuum electric tube devices." E. Y. Robinson and Associated Electrical Industries, Ltd. September 26th, 1930. (364,098.)
26,930. "Telephone systems." Automatic Telephone Manufacturing Co., Ltd., C. Gillings, F. T. Belas, F. E. Comyn, and G. F. Sargeson. September 26th, 1930. (364,032.)
29,129. "Loud-speaker units or like sound-reproducing apparatus." W. L. Colassi. September 29th, 1930. (364,099.)
29,351. "Traffic control signalling apparatus." B. G. Garwood and F. N. Parker. October 1st, 1930. (364,119.)
29,363. "Electric tumbler switches." G. H. Ide and H. L. Bentley. October 1st, 1930. (364,121.)
29,409. "Telephone and like cables." Hackenthal Draht und Kabel Werke Akt.-Ges. October 1st, 1929. (Patent of addition not granted.) (364,122.)
29,413. "Automatic stop for electrically driven machines." W. J. Gibbs. October 5th, 1929. (364,155.)
29,490. "Automatic or semi-automatic telephone system." Standard Telephones & Cables, Ltd., and E. P. G. Wright. October 2nd, 1930. (364,158.)
29,516. "Electric regulators." J. Stone & Co., Ltd., and A. E. Honey. October 2nd, 1930. (Cognate application 8,393/31.) (364,162.)
29,742. "Dynamo-electric machines." British Thomson-Houston Co., Ltd., J. A. Jeffrey, and G. Orchard. October 4th, 1930. (364,176.)
30,016. "Snap action devices." International General Electric Co., Inc. October 7th, 1929. (364,189.)
30,030. "Dynamo-electric machines." Siemens-Schuckertwerke Akt.-Ges. November 11th, 1929. (364,191.)
30,054. "Manufacture of telephone selector banks and like electrical apparatus." W. E. Pattman, A. W. Sherwood, and Bakelite, Ltd. October 7th, 1930. (364,192.)
30,225. "Electric switch fuses." W. Preston. October 9th, 1930. (364,196.)
30,268. "Electric motor controllers." British Thomson-Houston Co., Ltd. October 9th, 1929. (364,193.)
30,287. "Choking coils for heavy current networks." Siemens-Schuckertwerke Akt.-Ges. January 25th, 1930. (364,200.)
30,494. "Moving-iron circular coil measuring instruments." L. Mellersh-Jackson (Siemens & Halske Akt.-Ges.). October 11th, 1930. (364,206.)
30,625. "Cooling arrangements for thermionic valves and other electric discharge devices." Telefunken Ges. für Drahtlose Telegraphie. October 11th, 1929. (364,212.)
32,681. "Electric railway system." H. K. Whitehorn. October 30th, 1930. (364,230.)
32,705. "Device for exploring or reconstituting an object or image for use with systems of picture telegraphy, copying telegraphs or television, and the like." E. Wotton October 31st, 1930. (Cognate applications 32,706/30 and 32,707/30.) (364,231.)
32,706. "Device for exploring or reconstituting an object or image for use with systems of picture telegraphy, copying telegraphs, or television." E. Wotton. October 31st, 1930. (364,232.)
33,118. "Control of distant mechanisms by wireless communication." Chance Bros. & Co., Ltd., and J. H. Abbink-Spaink. November 4th, 1930. (364,237.)
33,119. "Automatic electric current generating apparatus." Chance Bros. & Co., Ltd., and J. H. Abbink-Spaink. November 4th, 1930. (364,238.)
33,385. "Insulation of electric cells, more particularly the cells of electric batteries of the high tension type." E. Hibou. November 6th, 1930. (364,240.)
34,748. "Electric fuses." British Thomson-Houston Co., Ltd. November 18th, 1929. (364,258.)
34,977. "Cut-out insulators for electrical purposes." A. B. Rains (trading as E. Chapman). November 20th, 1930. (364,263.)
34,989. "Telegraphic systems." C. Lorenz Akt.-Ges. January 14th, 1930. (364,264.)
35,173. "Electric transmission systems." Sir W. G. Armstrong Whitworth & Co. (Engineers), Ltd., and C. J. H. Trutch. November 21st, 1930. (364,268.)
35,252. "Electric hot-plates." M. Zerelles. November 22nd, 1930. (364,271.)
35,701. "Magneto generators." J. W. Record and Record Electrical Co., Ltd. November 27th, 1930. (364,278.)
36,482. "Manufacture of electric cables and articles made of lead or lead alloys." Pirelli-General Cable Works, Ltd., and G. Martinez. December 3rd, 1930. (364,289.)
37,327. "Electric totalisators." Ericsson Telephones, Ltd., C. W. Wilman, L. W. Smith, and T. Lyden. December 11th, 1930. (364,299.)
38,339. "Electron discharge tubes and similar vacuum devices." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. July 19th, 1930. (364,318.)
38,814. "Electric cooking appliances." Revo Electric Co., Ltd., F. H. Reeves, and S. F. Bickell. December 24th, 1930. (364,326.)
39,102. "Electromagnetic friction clutch." F. Seeberger. December 27th, 1929. (364,330.)

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907. "Electric switches with arc extinction by means of self-generated vapours." Siemens-Schuckertwerke Akt.-Ges. January 25th, 1930. (364,345.)
949. "Electrically heated washing machines." H. E. G. Rowley (Baer & Stein Metallwaren-Fabrik Akt.-Ges.). January 12th, 1931. (364,347.)
983. "Electric clocks." I. H. Parsons and A. E. J. Ball. January 12th, 1931. (Cognate application 5730/31.) (364,350.)
1,262. "Construction of electric accumulator cells." V. C. J. Nightingall. January 24th, 1930. (364,353.)
1,737. "Means for igniting mercury arc lamps and similar discharge devices." Schering-Kahlbaum Akt.-Ges. January 18th, 1930. (364,356.)
2,436. "Tramway and railway vehicles." Electro-Mechanical Brake Co., Ltd., and S. Smith. January 24th, 1931. (364,363.)
3,721. "Receiving devices for the television of stationary and moving objects." Compagnie pour la Fabrication des Compteurs et Matériel d'Usines à Gaz. February 13th, 1930. (364,376.)
4,464. "Appliances for electrically stunning animals." R. Gassner. February 12th, 1931. (364,386.)
4,782. "Means for igniting mercury arc lamps and similar discharge devices." Schering-Kahlbaum Akt.-Ges. February 15th, 1930. (364,393.)
6,332. "Electric discharge tubes." Egyesult Izzolampa es Villamossagi Reszvenytarsasag. October 17th, 1930. (364,411.)
6,896. "Electrical musical instruments." Siemens & Halske Akt.-Ges. March 5th, 1930. (364,415.)
7,185. "Thermally operated electric switch." R. Haddan (Moffats, Ltd.). March 7th, 1931. (364,420.)
7,267. "Electric heaters." K. Bader. March 17th, 1930. (364,421.)
8,045. "Variable electric condensers." General Electric Co., Ltd., and W. H. Peters. March 16th, 1931. (364,431.)
9,923. "Caps for carbon electrodes for dry batteries and so forth." E. Kleinmann and A. Mendel (trading as Kleinmann Geb.). April 1st, 1931. (364,448.)
10,365. "Device for preventing the theft of incandescent electric lamps." R. Weil. April 14th, 1930. (364,456.)
12,810. "Depolarisers for primary electric cells or batteries." Every Ready Co. (Great Britain), Ltd., and R. H. Spettigue. April 30th, 1931. (364,476.)
12,811. "Electric battery lamps." Ever Ready Co. (Great Britain), Ltd., and A. H. Sheppard. April 30th, 1931. (364,477.)
13,317. "High tension electric cables." Soc. Italiana Pirelli. July 25th, 1930. (364,481.)
14,088. "Luminous electric discharge tubes." General Electric Co., Ltd. July 18th, 1930. (364,484.)
15,483. "Electrically driven rotary pumps." Drysdale & Co., Ltd., J. W. W. Drysdale, and J. Young. May 27th, 1931. (364,493.)
16,273. "Manufacture of electric incandescent lamps or the like articles." General Electric Co., Ltd. July 17th, 1930. (364,501.)
17,307. "Handle for electric accumulators." F. R. Francke. June 15th, 1931. (364,505.)
17,505. "Protective systems for electron discharge devices." British Thomson-Houston Co., Ltd. June 23rd, 1930. (364,509.)

Trade Mark Applications

THE following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from January 20th :—

Genalex. No. 528,030. Class 6. Refrigerating machines.—General Electric Co., Ltd., Magnet House, Kingsway, W.C.2.

Gecovalve. No. 526,739. Class 8. Photo-electric cells and parts thereof.—General Electric Co., Ltd.

Merstron. No. 527,958. Class 8. Apparatus for use in radio-telegraphy and telephony.—Magnavox (Great Britain), Ltd., 89, Kingsway, W.C.2.

Ardorite. No. 527,617. Class 16. Insulating parts of electrical apparatus of porcelain or earthenware.—Justus Eck, 10, Priory Road, Bedford Park, W.

Marconi. No. 521,638. Class 18, and G. Marconi (lettering and design). No. 521,640. Class 16. Radio-telegraphic and telephonic apparatus for use in communication with tolls, and complete radio-telegraphic and telephonic installations in ships and aircraft principally intended for navigation purposes.—Marconi's Wireless Telegraph Co., Ltd., Marconi House, Strand, W.C.2.

Pulpax. No. 517,948. Class 50. Electric insulating substances made of compressed paper and synthetic resin.—Micanite and Insulators Co., Ltd., Empire Works, Blackhorse Lane, Walthamstow, E.17.

Siecolux. No. 527,477. Class 50. Lamp shades made of cellulose acetate.—J. Weinbaum, trading as the Stormlight Electrical Co., 160-164, Mile End Road, E.1.

New Work for Contractors

Particulars of new works and building schemes for the use of electrical installation contractors and traders

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Bexley (KENT).—Houses (49), Welling, for W. Grubb. Block of 11 shops, Bellegrove Road, for T. C. Hills.

Birstall (YORKS).—Additions, Prospect Mill; Taylor, Yielding and Co., Ltd.

Blackpool.—Re-erection of bazaar premises for R. H. & O. Hill, Ltd. (£70,000).

Blaydon-on-Tyne.—Rebuilding the Bottle House Arms; J. Jackson & Sons, Corporation Street, Newcastle.

Bournemouth.—Hotel, corner of Broadway Lane and Castle Lane; Strong & Co. Extensions, printing works, Christchurch Road; F. Rigler. Houses (28), Castle Lane, for the Hants Land Society.

Bromley (KENT).—Houses (24), off Raglan Road, for W. J. Cooke & Co., Ltd.

Camborne.—Houses (54), Carne site, for U.D.C.

Cardigan.—Cinema, Main Street; H. Williams, architect, St. Andrew's Crescent, Cardiff.

Carlisle.—Houses (64), for the T.C.; P. Dalton, city engineer.

Chatham.—Houses (40) for the T.C.; borough surveyor.

Chester.—Pump house, Lache sewerage scheme, for the T.C.; city. engineer.

Chesterfield.—Extensions to works of Wilfred Edmunds, Ltd., Station Road; Wilcockson & Cutts, architects, Slatergate. Houses (50), Staveley, for the U.D.C.; surveyor.

Colne (LANCS).—Re-erection of tannery, Cretontree, for W. and J. Sagar (£100,000).

Coulsdon (SURREY).—Shops (24), Southview Estate; H. Hemmings, Ltd.

Croydon.—Showrooms, High Street and Lower Coombe Lane; Marsham Tyre Co., Ltd. Improvements (electrical work), public hall; extensions and maternity block, Mayday Road, hospital (£85,000); H. Berney, architect.

Derby.—Houses (1,041), for T.C.

Douglas (I.O.M.).—Photographic works, Castle Hill; I. Corkill & Co.

Dumbarton.—Houses (40), adjoining Boghead football ground, for T.C.

Dumfriesshire.—Academy, Moffat (£13,000), for the E.C.

Durham (HARTLEPOOL).—Extensions to Henry Smith School (£6,000), for C.C.

East Ham.—Employment exchange; H.M. Office of Works, King Charles Street, S.W. Nursery block, Aldersbrook Children's Homes (£27,294), for T.C.; Hammond & Barr, Ltd., builders, Chelsea.

Edinburgh.—Houses (254), Saughton, for Corporation; city architect. Houses (50), Corstorphine; Hepburn Bros., 95, Shandwick Place. Houses, Captains Road; Penman & Inglis, builders, 46, Eyre Place.

Fifeshire.—Buildings, Cupar, for Territorial Army Association of Fife; James Gillespie & Scott, architects, St. Andrews.

Gillingham (KENT).—Alterations, Invicta Cinema, High Street; A. Candler, builder, 98, Gillingham Road.

Glasgow.—Cinema, Knightswood; J. B. Robertson, 38, Rotherwood Avenue. Houses (164), South Chesterton Street; housing director.

Haverfordwest.—Cinema, Piston Place; H. Williams, architect, St. Andrew's Crescent, Cardiff.

Hertford.—Houses (79) for the T.C.; borough surveyor.

Hertfordshire.—Extensions, Haymeads Institution, Bishop's Stortford (£32,788), for C.C.; G. L. Thurgood & Son, Ltd., builders, Much Hadham.

Highworth (WILTS).—Pumping station, Upper Wanborough, for the R.D.C.; A. H. S. Waters, engineer, 25, Temple Row, Birmingham.

Hounslow.—Factory, Fairfields Road; C. & S. Construction Co., builders, Worton Road, Isleworth.

Irish Free State.—(AUGHAWILLAN, Co. LIMERICK).—National School; J. Cassedy, secretary, Office of Public Works, Dublin. (BALLYNAKELLY).—Elementary school; Regional Education Committee. (CABRA, Co. DUBLIN).—Houses (76); W. J. Brown, architect, 50-51, Upper Mount Street, Dublin. (CORK).—Technical schools, Bandon, Macroom and Queenstown, for the E.C. (MULLINGAR, Co. WESTMEATH).—Cathedral; W. H. Byrne and Son, architects, 20, Suffolk Street, Dublin.

Kettering.—Factory extensions, Meeting Lane; Munn and Felton.

Lanarkshire.—Houses (111), Blantyre & Cleland, with electrical work; P. C. Smith, architect, 13, Clydesdale Street, Hamilton.

Lee (KENT).—Shops (8) and houses (48), off Baring Road; W. J. Scudamore, Ltd.

London.—(BERMONDSEY).—Flats (20), Vaughan Street area (£12,000); Borough Council works manager. (EDMONTON).—Shops with flats, Church Street; A. J. King, Ltd., builders, 62, Southgate Road, N.1. (LEWISHAM).—Equipment, Town Hall (£8,000); Town Hall Committee. (PADDINGTON).—Buildings, 21-43, Edgware Road; North Robin & Wilsdon, architects. Cinema, corner of Queen's Road and Bishop's Road; J. Stanley Beard & Clare, architects. (STRAND).—Rebuilding London School of Economics, Clare Market; Trehearne & Norman, architects. (TOTTENHAM).—Cinema, Green Lanes; B. Holland. Factory, White Hart Lane; Direct Supply Co. Factory, Overbury Road; W. Burtie & Sons, Ltd.

Lydney (GLOS).—Houses (24) for the R.D.C.; surveyor.

Maidenhead.—Houses, Stroud Farm, Bray; Halfacre and Young, builders, St. Mark's Road, Maidenhead.

Maldon (ESSEX).—Block of shops and stores, High Street, for Sterling Estates, Ltd.

Manchester.—Warehouse and offices in Potato Wharf Road, and additions to shirt factory, Ramsgate Street, Cheetham; C.W.S. Architect's Department, Balloon Street.

Mossley.—Elementary schools, Seel Fold, Mossley; Byron and Noble, architects, 9, Victoria Buildings, Silver Street, Bury.

Moston.—Weaving shed at mill, Moston Lane, Moston; Jonathan Partington, Ltd., contractors, Middleton Junction, near Manchester.

Newcastle-on-Tyne.—Houses; G. Bailey, Ltd. (184), builders, South Shields, and M. J. Gleeson, Ltd. (200), builders, Sheffield. Schools, Cowgate (£67,000), and Wharrier Street, Walker (£61,000); E.C.

Newport (MON).—Cinema, Maindee Square; H. Williams, architect, St. Andrew's Crescent, Cardiff.

Newport (I.o.W.).—Factory, Blackhouse Quay; J. H. Slater.

Northampton.—Extensions, Infirmary, with lifts; borough engineer. Houses (20), Kettering Road; T. Wilson & Son, Ltd. Houses (115), Billing Road and Rushmere Road; A. Glenn and Sons, Ltd.

Northern Ireland.—(ANTRIM).—Antrim Mental Hospital (electrical installation); F. D. Brown, 93, Ann Street, Belfast. (HOLYWOOD, BELFAST).—Hospital, Holywood Military Barracks; McDowell & Fitzsimon, builders, Lurgan, Co. Armagh.

Norwich.—Mental institution, Drayton; city engineer. Adapting premises for municipal office extensions; city engineer.

Oxford.—Mental occupation centre, Bury Knowle; city surveyor.

Paignton.—Houses (24), Old Dartmouth Road; U.D.C. surveyor.

Penarth.—Cinema, for West of England Cinemas; H. Williams, architect, St. Andrew's Crescent, Cardiff.

Pontefract.—School (500 places) for the E.C.

Pudsey.—School (300 places), Waterloo, for the E.C.

Rainhill.—Houses (50) for the County Mental Hospital; Richard Owens & Son, architects, Crosshall Street, Liverpool.

Rochdale.—Alterations for the directors of King's Road Cinema; Drury & Gomersall, architects, Imperial Buildings, Oxford Road, Manchester.

Rugby.—Houses, Bilton Road, on Bridport Housing Estate; J. H. & R. B. Liddington, architects, 29, Regent Street.

Rugeley (STAFFS).—Houses (22), for the U.D.C.; surveyor.

St. Ives (HUNTS).—Re-erection of chicory factory (electrically equipped); proprietor.

Sanderstead.—Houses (108), Croham Heights Estate; R. Costain & Sons.

Seaham Harbour.—Houses (50), Deneside Estate; U.D.C. surveyor.

South Shields.—Hall and shops next to "Palladium," Harton, for Thompson's Amusements, Ltd.; J. M. Morton & Son.

Staffs.—Conversion of institutions, Newcastle and Wordsley, into hospitals (£243,000), for the Public Assistance Committee; clerk, Stafford.

Stoke-on-Trent.—Works, Tean Hall Mills, Tean, for J. & N. Phillips & Co., Ltd.; J. W. Beaumont & Sons, architects, 24, Brazennose Street, Manchester.

Stonecastle and Tarbolton (AYRSHIRE).—Houses (68), with electrical work; William Reid, county architect, 14, Wellington Square, Ayr.

Stourbridge.—Post office extensions; H.M. Office of Works, King Charles Street, S.W.

Surrey.—Three schools, St. Helier Estate, Hinchley Wood and Esher, for the County E.C.; W. W. Finny, secretary, Kingston-on-Thames.

Swansea.—Improvements to station, High Street, for the G.W. Railway. Alterations, Gem Cinema, Sway Road, Morriston; W. E. Ballard. Alterations to the "Empire," Oxford Street; Moss Empires, Ltd.

Tamworth (STAFFS).—Houses (78), Kingsbury, for the R.D.C.; surveyor.

Teddington.—Showrooms, Waldegrave Road; F. & C. Russell.

Thakeham (SUSSEX).—Houses (24), Washington, for the R.D.C.; surveyor.

Thames Ditton.—Re-erection of works, Imber Court, for the Metropolitan Concrete Works, Ltd. (£15,000); secretary.

Thirsk (YORKS).—Re-erection of Gaiety Cinema, Long Street; F. J. Martin, lessee.

Tiree.—Reconstruction of Cornaigmore higher grade school, Island of Tiree (£11,000); headmaster.

Tynemouth.—Houses (300), for T.C.; J. L. Beckett, borough engineer, Town Hall. Development, Balkwell Estate; W. Moore. Houses (18); W. Stockdale, architect.

Wednesbury.—Reconstruction of the Springhead Central Hall for the Wesleyan Methodist Authorities (£14,000); Arthur Brocklehurst & Sons, architects, Martin's Bank Chambers, 10, Norfolk Street, Manchester.

Wembley.—Houses (54), Perivale Lane; U.D.C. surveyor.

West Riding.—Grammar school, Windmill Ba'k Lane Adwick-le-Street; Education Committee. Maternity home (£10,000), for C.C.

Weymouth.—Development of Gulleyshay Estate; J. Hardy.

Wheelwright (YORKS).—Electric wiring at Girls' Grammar School, Birkdale Road; town clerk, Town Hall, Dewsbury.

Whiston (YORKS).—Reconstruction, Chequers Inn; Gilmore's Brewery Co., Ltd.

Whitby.—Houses (52) and pumping station for the U.D.C.; R. A. Wilson & Sons, builders.

Winchester.—Houses (94) for T.C.; city engineer.

Wingate (Co. DURHAM).—Re-erection of business stores for the Station Town, Seaham & Horden Co-operative Society (£35,000); J. W. Brown, secretary.

Wishaw.—Motor body building works, Kirk Road, for J. Stewart, Ltd.; the manager. Public library (£6,000); borough surveyor.

Woking.—Remodelling sewage pumping stations, with electrical plant (£2,660), for the U.D.C.; surveyor.

Wolverhampton.—Cinema (2,500 seats), Snow Hill, for the Associated Provincial Picture Houses, Ltd.; McLaughlin & Harvey, builders, 24, Highbury Grove, N.5.